Chapter 1: An Overview of PSD

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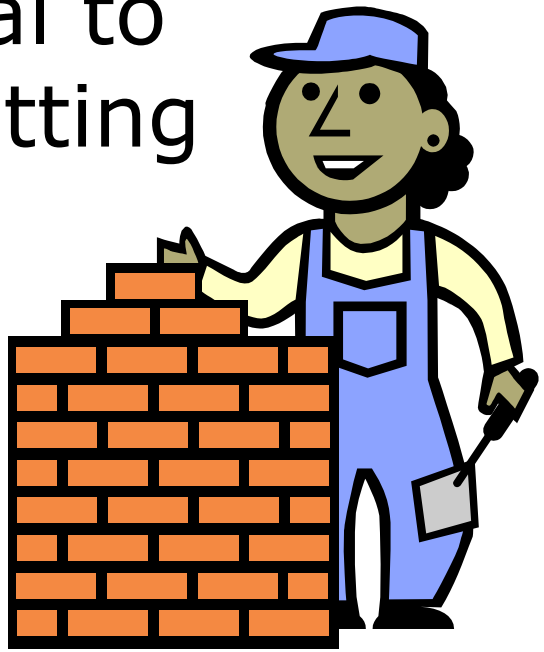
Overview

PSD = "Prevention of Significant Deterioration"

- A regulatory (permitting) program
- Applicable to major source and major modifications at major sources in attainment areas
- Designed to maintain air quality, while allowing for industrial growth

Overview

An understanding of PSD terminology is essential to understand PSD permitting



Overview (cont.)

- In very general terms, PSD Permitting is based on:
  - Physical Location (attainment areas)
  - Facility attributes
  - The proposed "project"
  - Past operation
  - Future or projected operations

Important Terms

National Ambient Air Quality Standards (NAAQS)

- Pollutant specific ambient concentrations established and updated by EPA
- Established for PM10, PM2.5, CO, SO2, NO2, lead, Ozone (the criteria pollutants)
- Comprised of primary and secondary standards
- Applied on a geographic basis

See Page 15 of workbook

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
	Secondary	1-hour	35 ppm	
Lead (Pb)	Primary and Secondary	Rolling 3-month average	0.15 $\mu g/m^3$	Not to be exceeded
Nitrogen Dioxide (NO_2)	Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	Primary and Secondary	Annual	53 ppb	Annual mean
Ozone	Primary and Secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
PM2.5	Primary	Annual	12 $\mu g/m^3$	Annual mean, averaged over 3 years
	Primary and Secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
PM10	Primary and Secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Important Terms – cont.

"Attainment Areas"

- Geographic areas of the state where measured air concentrations are below the NAAQS
- The goal of PSD permitting is to allow for industrial growth in these areas, while maintaining air quality

Important Terms – cont.

"Attainment Areas"

those areas of the state where we are meeting the NAAQS

- Statewide attainment (currently) for:
  - Carbon Monoxide
  - Nitrogen Dioxide
  - Ozone
  - PM10
  - PM2.5

Important Terms – cont.

"Non-Attainment Areas"

Geographic areas of the state where measured air concentrations are above the NAAQS

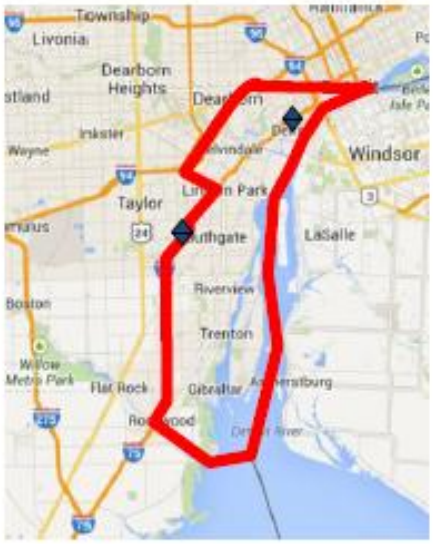
- Currently two non-attainment areas:
  - A portion of Wayne County for sulfur dioxide
  - A portion of Ionia County for Lead

Important Terms – cont.

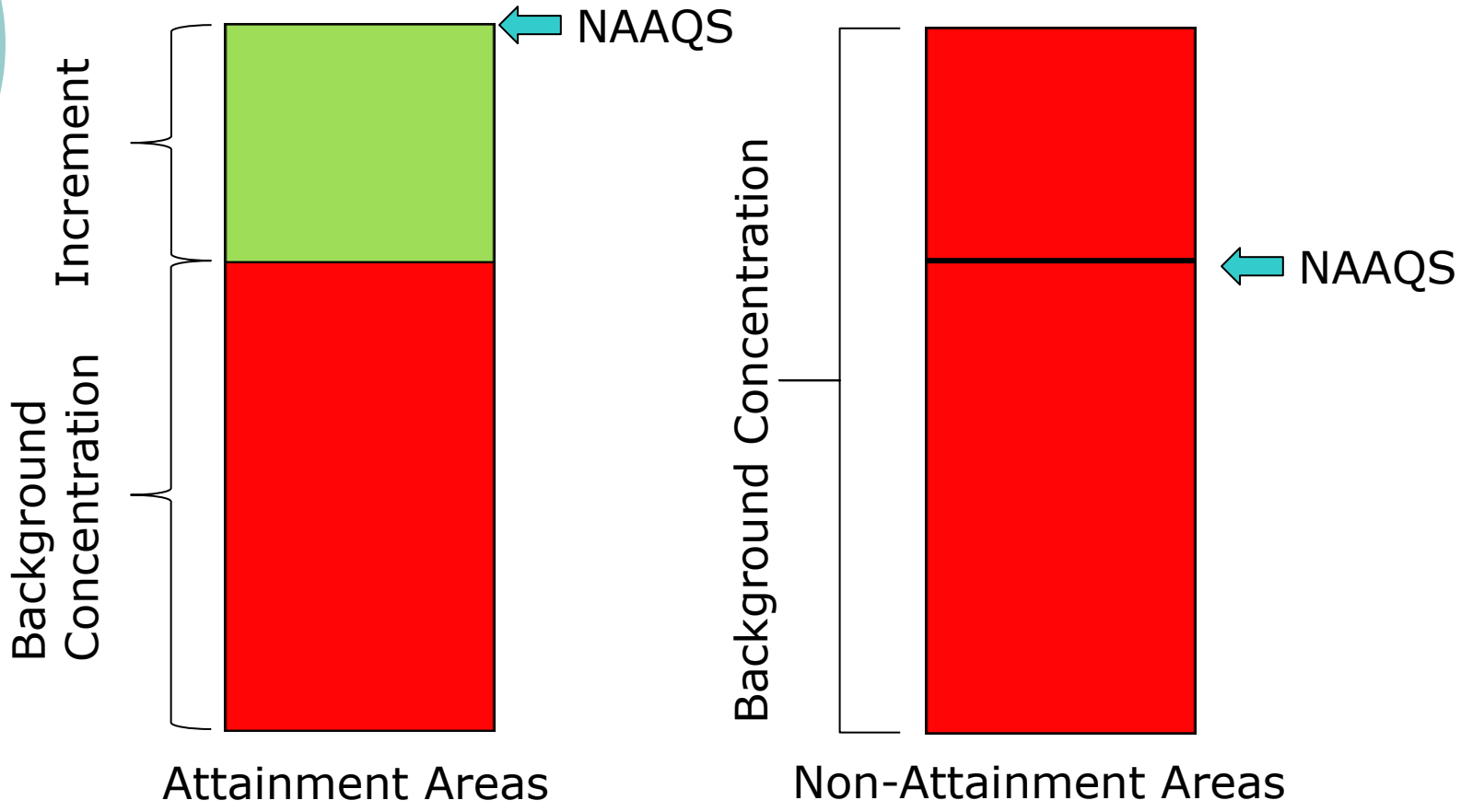
Nonattainment Areas:

- **Sulfur Dioxide [SO_2]**

In Wayne county, a corridor that runs along US 75 extending east to the shoreline border was recently designated to nonattainment with the new 2010 standard.



Important Terms – cont.

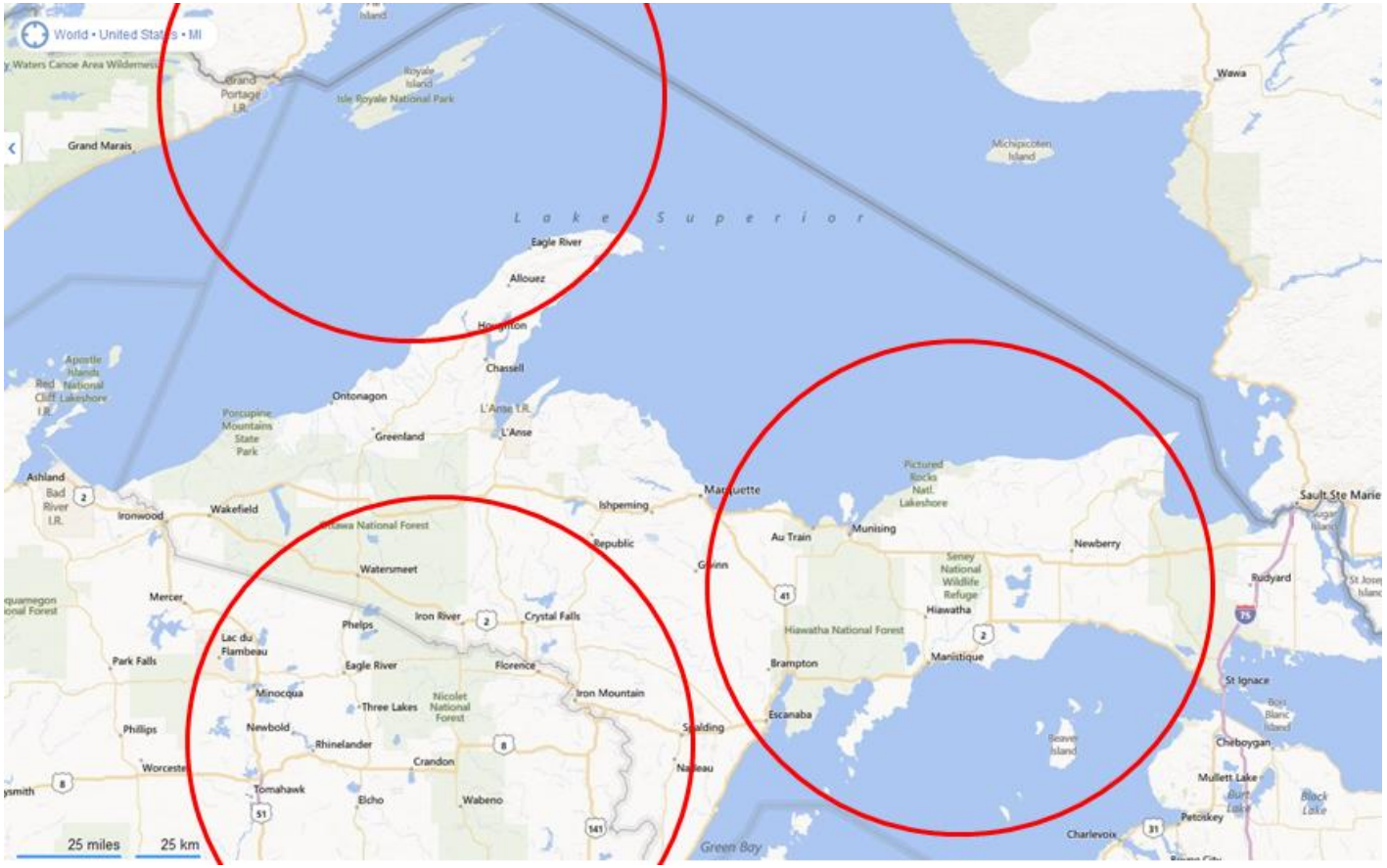


Important Terms – cont.

"Class I Area"

- Attainment area
- Has scenic, recreational, or historic value (national parks, national shorelines, areas of historical significance, and wilderness areas)
- Are required to have additional analysis done
- Are allowed lesser degradation than Class II areas

Important Terms – cont.



Important Terms – cont.

"Class II Area"

- Attainment areas which are not regulated as stringently as Class I areas.
- Regulated under Section 162 of the CAA.
- Table 2 (p.16) provides comparison of Class I and Class II areas.

Important Terms – cont.

Pollutant	Averaging Period	PSD Class I Increment	PSD Class II Increment	Model Value Used for Comparison to NAAQS
SO_2	3-hour	25	512	Highest Second High
	24-hour	5	91	Highest Second High
	Annual	2	20	Highest
PM10	24-hour	8	30	Highest Second High
	Annual	4	17	Highest
PM2.5	24-hour	2	9	Highest Second High
	Annual	1	4	Highest
NO_2	Annual	2.5	25	Highest

Important Terms – cont.

"PSD Increment Concentrations"

- An increment is an allowable increase in the ambient concentration of a criteria Pollutant
- A PSD source cannot consume more than the allowable increment.
- Increments established for SO2, PM10, PM2.5, and NO2
- Increment values provided in Table 2, (p. 16) of the workbook

Important Terms – cont.

Regulated NSR Pollutants

- Any pollutant which:
  - Has a NAAQS and/or;
  - Is regulated under an NSPS and/or;
  - Is regulated under the CAA (non HAPs) and/or;
  - Contributes to depletion of stratospheric ozone.

Important Terms – cont.

"Project"

- Physical change or change in the method of operation at a existing stationary source
  - May impact other emissions units
    - De-bottlenecking
  - All parts of the project must be considered in the applicability analysis

Important Terms – cont.

"Best Available Control Technology"

- An emission limit
- Source specific
- Determined by a specific procedure.
  - The five step "top down" approach starting with most stringent control

Important Terms - cont.

"Potential to Emit (PTE) "

Maximum capacity to emit a pollutant

- Based upon the use of a control device or devices
- Must be enforceable as a practical matter (contained in a permit)

- See www.michigan.gov/deqair (select "Clean Air Assistance" then "Potential to Emit"

Important Terms – cont.

"Significant Thresholds" – (p. 20)

- A level of emissions used to determine PSD applicability for a project at an existing major stationary source.
- To be subject to PSD the following must be true:
  - Significant emissions increase
  - Significant net emissions increase

Important Terms – cont.

"Major and Minor Source"

- Classification of a facility based upon its potential emissions of a NSR regulated pollutant.
- Major source thresholds are either 100 tpy or 250 tpy (depending on facility type)
- See Table 3 (p. 19 of workbook)

Important Terms – cont.

Fossil fuel-fired steam electric plants of more than 250 million BTU's per hour heat input	**Coke oven batteries**
Coal cleaning plants with thermal dryers	**Sulfur recovery plants**
Kraft pulp mills	**Carbon black plants (furnace process)**
Portland cement plants	**Primary lead smelters**
Primary zinc smelters	**Fuel conversion plants**
Iron and steel mill plants	**Sintering plants**
Primary aluminum ore reduction plants	**Secondary metal production plants**
Primary copper smelters	**Chemical process plants**
Municipal incinerators capable of charging more than 250 tons of refuse per day	**Fossil fuel boilers, or combinations thereof, totaling more than 250 million BTU's per hour heat input**
Hydrofluoric, sulfuric and nitric acid plants	**Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels**
Petroleum refineries	**Taconite ore processing plants**
Lime plants	**Glass fiber processing plants**
Phosphate rock processing plants	**Charcoal production plants**

See Table on Page 19 of workbook

Important Terms – cont.

"Contemporaneous Period"

Period of time (5 years) which precedes the commencement of operation of a new/modified source

- Used for quantifying emission increases and decreases

Important Terms – cont.

"Emissions Unit"

- Any part of a stationary source which emits (or has the potential to emit) a NSR regulated pollutant.
- Logical grouping of process equipment required to make a product or raw material.
- Additional guidance in AQD's Policies and Procedures

Important Terms – cont.

"Allowable Emissions"

- Level of emissions a source is allowed to emit by:
  - Permit
  - State rule
  - Federal regulation
- Allowable emissions:
  - Short term and long term
  - Mass or concentration

Important Terms – cont.

"Actual Emissions"

- Level of emissions actually emitted by the emission unit or source in a given timeframe
- Based upon:
  - Actual levels of production or capacity
  - Actual operating hours
  - Actual levels of emissions control

Important Terms – cont.

"Baseline Actual Emissions"

Average rate of actual emissions which occurred over a 24 month period.

- Continuous operation and emissions
- Can be calculated from either a 5 year or 10 year period (depending on the type of emission unit).

Important Terms – cont.

"Projected Actual Emissions"
Maximum level of emissions expected to occur.

- Any 12 month (consecutive) projection period during the projection period
- 12 month projection period can be within either a 5 year period, or a 10 year period
- Documentation on projection is critical

Important Terms – cont.

"Excludable Emissions"

- Emissions which "could have been accommodated" during the baseline period.
- Must have been achieved during the baseline period

Important Terms – cont.

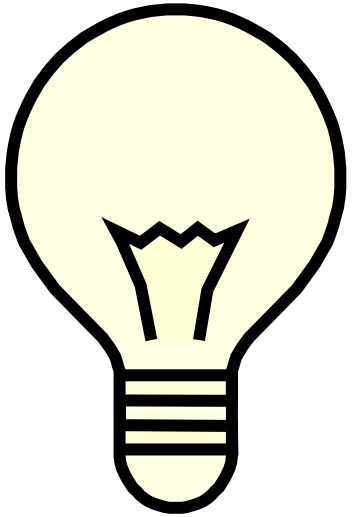
"Pre-Construction Monitoring"

One year of ambient monitoring data for any regulated NSR pollutant for which source/project is significant

- **Waiver may be granted based upon written request with justification**
- **Either monitoring, exemption, or waiver request must be provided**

Summary of Chapter 1

- We should now have an understanding of the important terms used for determining PSD applicability.
- More detailed explanations to follow



Questions?

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Chapter 2: PSD Applicability

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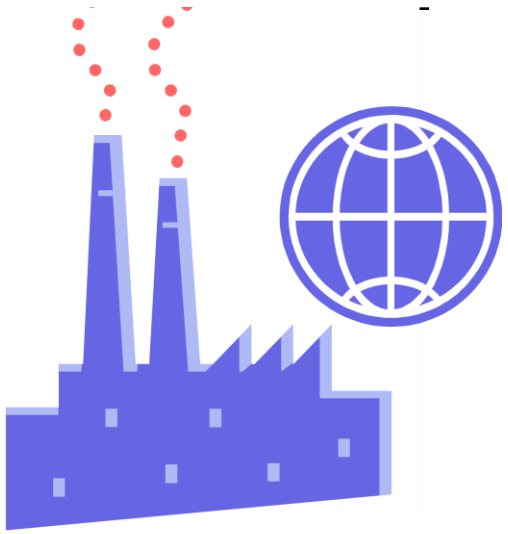
Outline

- Definition of a source
- Major and minor sources
- New and existing sources
- Modifications vs. excluded changes and projects
- Significant changes
- Determining the net Emissions change
- Changes not subject to applicability

PSD Summary Statement

If a proposed new source (or modification at an existing source) causes emissions increases greater than the appropriate applicable threshold, it will be subject to PSD.

Definition of a Source



R 336.2801(ss) defines a "stationary source" as:

". . . Any building, structure, facility, or installation which emits or may emit a regulated new source review pollutant"

Definition of a Source – cont.

While we usually consider a source to be a single structure or collection of structures at a geographic site, there are situations where a source can be multiple structures which may not be on a contiguous geographic site.

Definition of a Source – cont.

A source is considered to be:

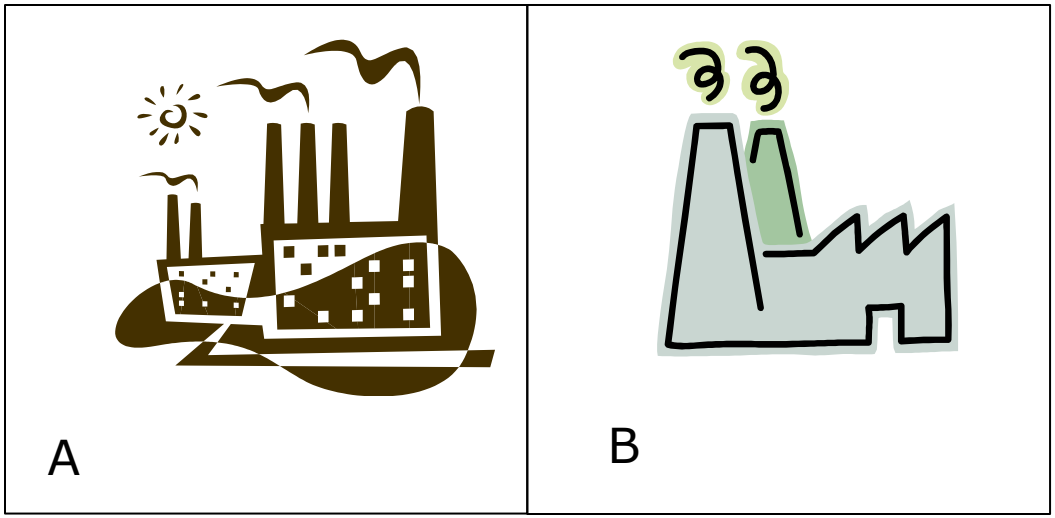
- **All** sources under common ownership or control.
- All facilities with the same SIC code
- All facilities are adjacent to one another or are contiguous

- An exception to the above criteria is a "support facility"

Definition of a Source – cont.

Example 1:

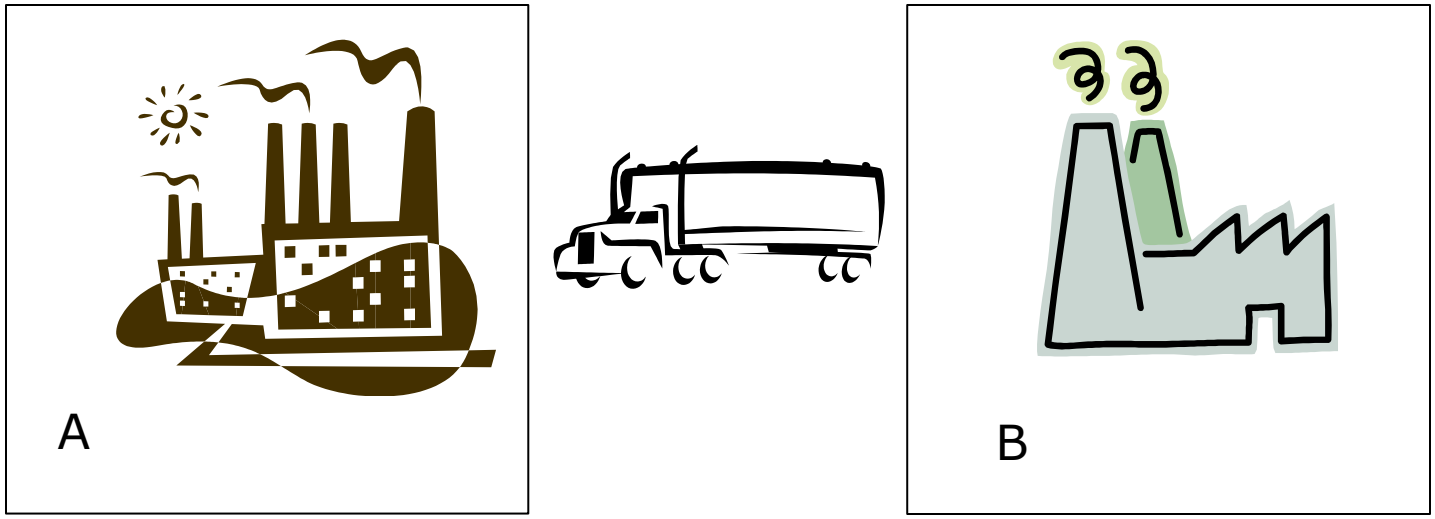
- Same owner
- Same major SIC grouping
- Different addresses, but a common physical boundary, adjacent
- A and B are the same facility



Definition of a Source – cont.

Example 2:

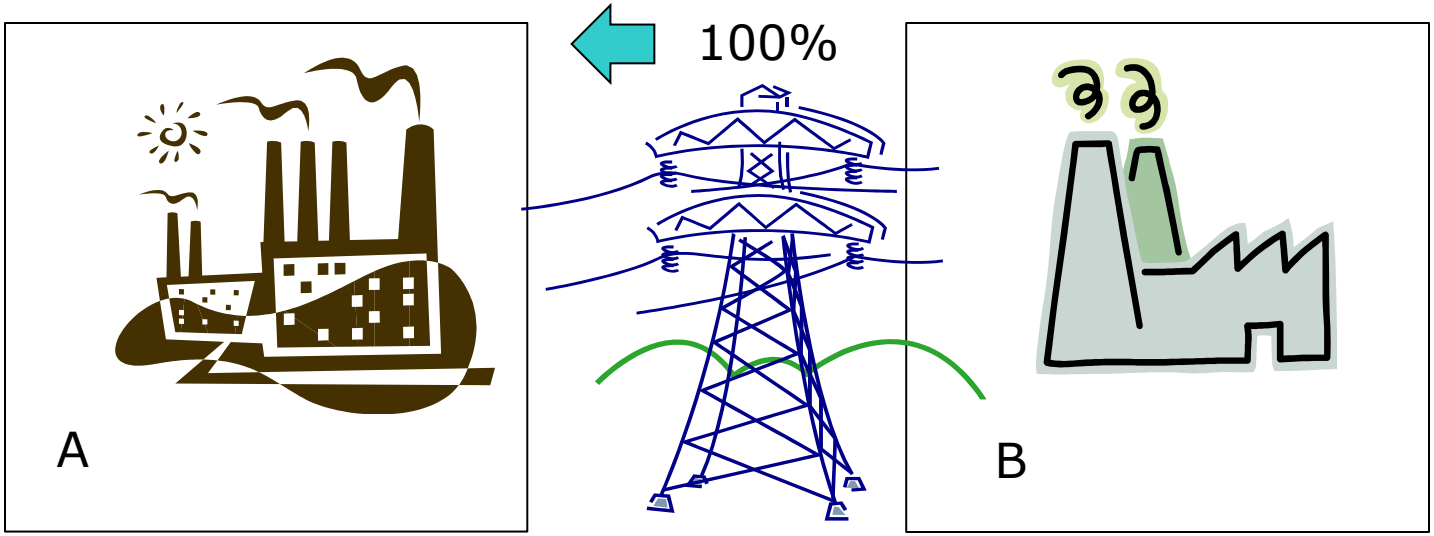
- Same owner
- Same major SIC grouping
- Different addresses, but are contiguous
- A and B are the same facility



Definition of a Source – cont.

Example 3:

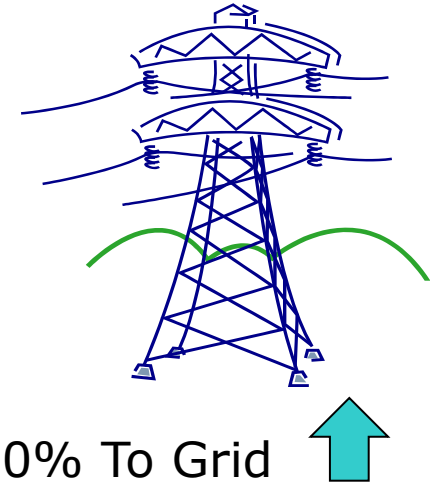
- Different owner
- Different major SIC grouping
- Different addresses
- A and B are the same facility. B is a support facility to A



Definition of a Source – cont.

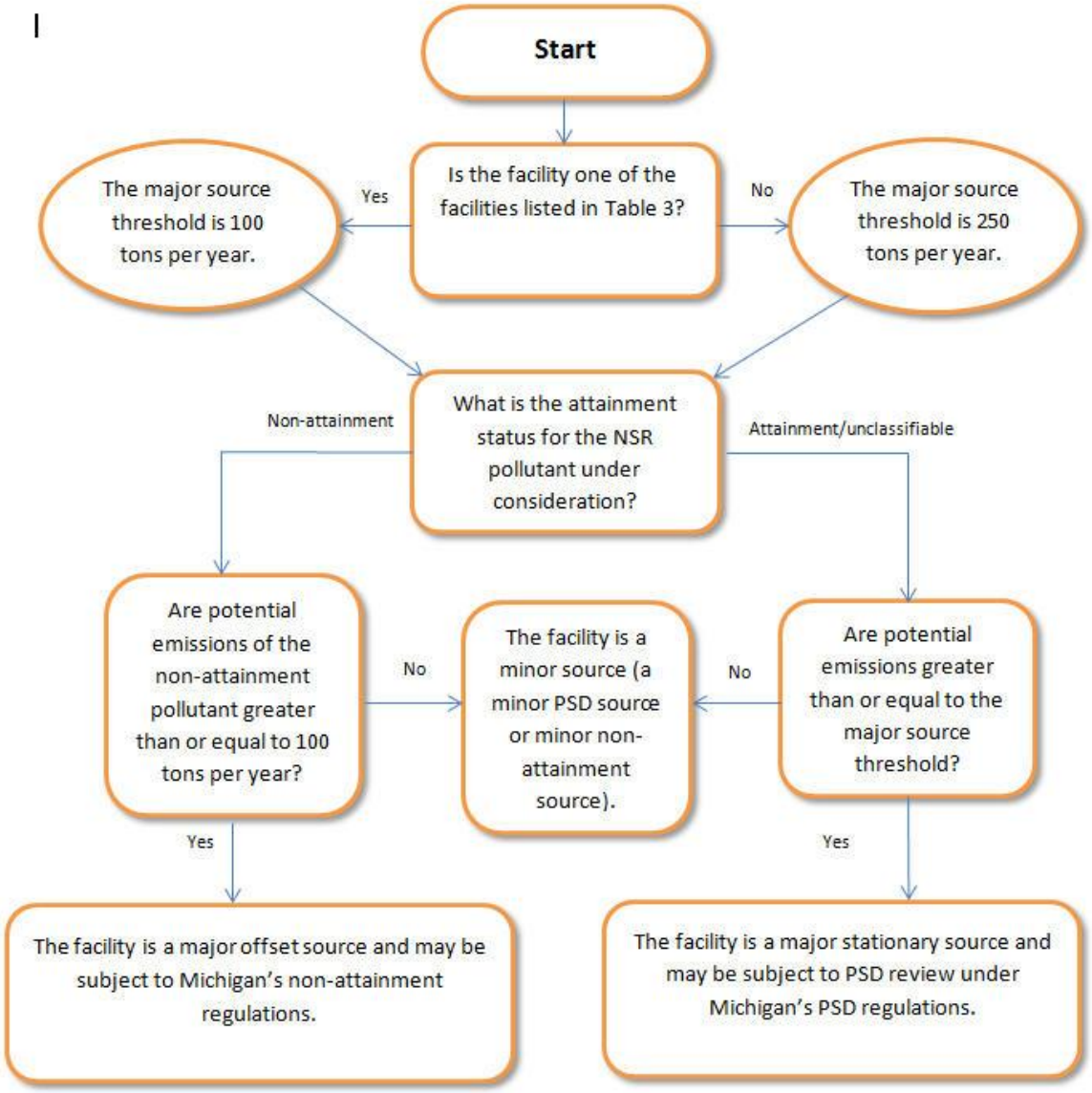
Example 4:

- Different owner
- Different major SIC grouping
- Different addresses
- A and B are separate facilities.



Major and Minor Source Status

- Major/Minor status determined by potential emissions of NSR regulated pollutants.
- Two thresholds:
- 100 tons per year
  - Includes fugitive emissions
- 250 tons per year



See Page 29 of Workbook

Facility Description: Four New Combined Cycle Natural Gas Turbines with a combined heat input of 11,228 MMBTU/hour

Source Category: Fossil fuel-fired electric plant with a capacity greater than 250 MMBTU/hr heat input

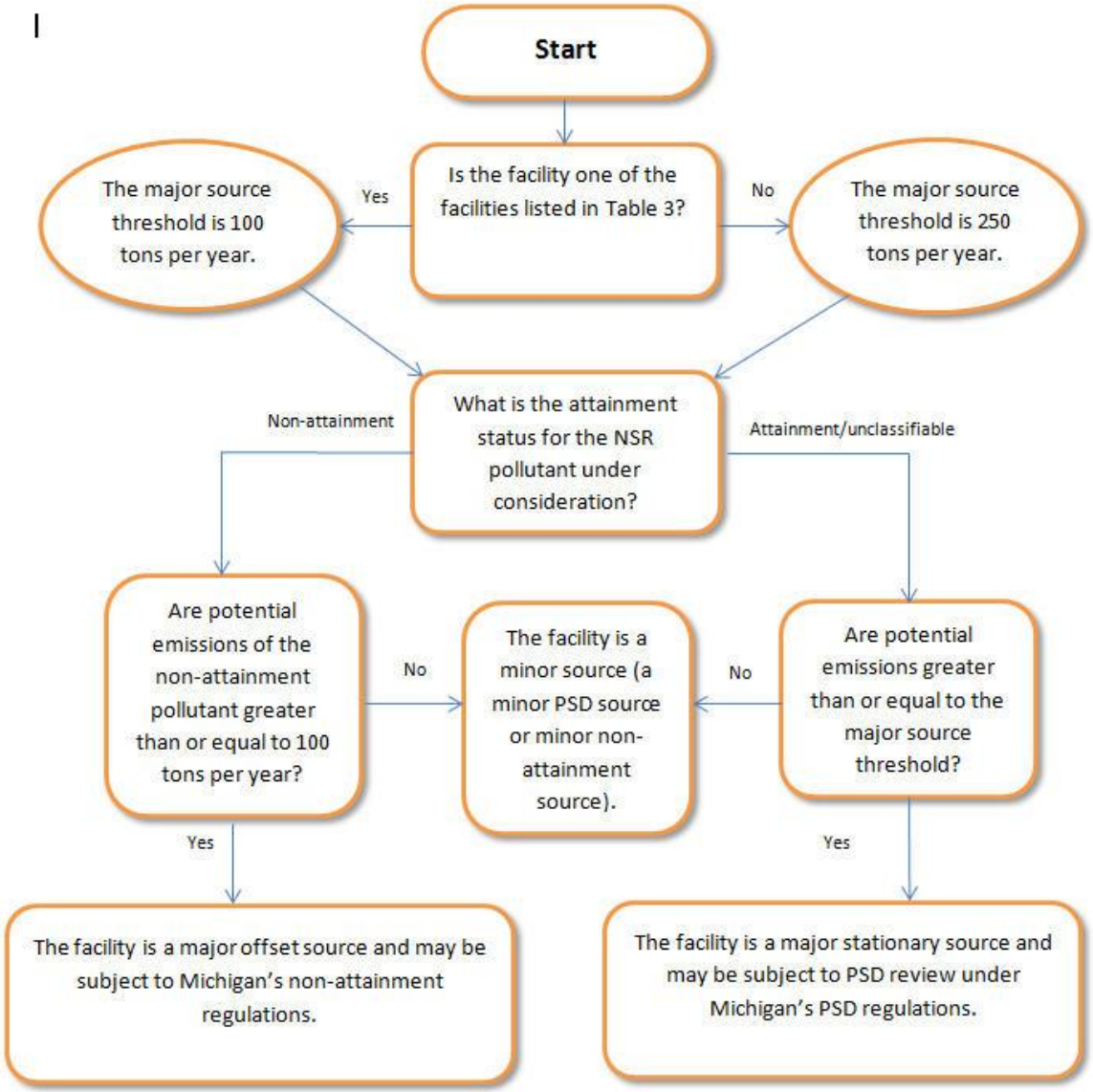
Facility Status: New, no past emissions

Location: Ingham County

Potential Emissions

CO	661 Tons per year
CO2e	5,397,056 Tons per year
NOx	508 Tons per year
PM10	210 Tons per year
PM2.5	204 Tons per year
SO2	36 Tons per year
VOCs	296 Tons per year
Sulfuric Acid Mist	5.7 Tons per year
Lead	0.00027 Tons per year

What NSR regulated Pollutants are subject to PSD?



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Major for CO, CO2e, NOx, PM10, PM2.5, and VOCs

CO2e has a significance threshold of 100,000 tons per year for new sources, and 75,000 tons per year for modified sources.

New and Existing Sources

"Existing"

- Has operated more than 24 consecutive months since the date of initial operation

"New"

- Has operated less than 24 consecutive months since date of initial operation
- An "idled or reactivated source" may be considered to be new.

Major Modifications

Major Modification

- Physical change/change in method operation, and;
- Has a significant emissions increase, and;
- Has a significant net emissions increase.

The PSD Applicability Matrix (p. 31)

	New Facility	Existing Non-PSD Facility	Existing PSD Facility
Minor Project	No PSD, but may require a minor source Permit to Install (PTI).	No PSD, but may require a minor source PTI.	No PSD unless the project by itself exceeds the significance threshold based on potential to emit, but may require a minor source PTI.
Major Project	PSD for projects that by themselves exceed the major stationary source thresholds along with any other NSR pollutants emitted at or above significance level.	PSD for projects that by themselves exceed the major stationary source thresholds along with any other NSR pollutants emitted at or above significance level.	PSD for each NSR pollutant emitted at levels greater than the significant levels.

Exempt Modifications

R 336.1801(aa)(iii) excludes the following activities from the definition of major modification:

- Routine maintenance, repair, and replacement;
- Alternative fuels;
- Change in ownership;
- Certain clean coal projects, etc.

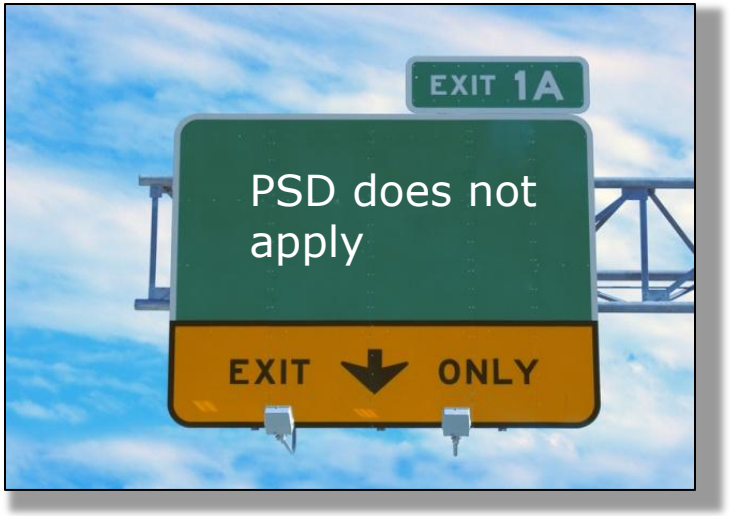
Significant Change

- For new sources, the net emissions changes are not considered since there are no baseline emissions
- For existing sources it is necessary to determine both the emissions increase and the net emissions increase
- If “emissions increase” and “net emissions increase” >significant, the project will be subject to PSD

Determining the Net Emissions Change

Net emission increases are calculated by one of three methods:

- The A2P (actual to potential) emissions test
- The A2A (actual to projected actual) emissions test
- The hybrid test



Summary

- We now know how to determine whether a project results in a significant emission increase based on;
  - Whether the source is a major or minor source
  - Whether the source is new or existing
  - Whether the project results in a significant emissions increase
- After we determine that there is a significant emissions increase, the next step is to determine the net increase, which will be discussed in Chapters 3, 4, and 5

Questions?

Michigan Department of Environmental Quality

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Chapter 3: Baseline Actual Emissions (BAE)

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Outline for BAE

- What are BAE? (p. 37)
- Purpose of BAEs (p. 37)
- Different BAE for different types of Emission Units (p. 37)
- Steps for EUSGU (p. 38-39)
- Steps for Non-EUSGU (p. 39-41)

BAE

- What are BAE?
  - BAE are the starting point for PSD Applicability Determinations
- BAE are established for 2 specific purposes:
  - For modifications
  - For netting

BAE (cont.)

Baseline Actual Emissions are:

- The average rate of emissions, in tons per year, of a regulated NSR pollutant that actually occurred over a consecutive 24-month period; and
- Calculated on an emissions unit (EU) specific basis.

BAE (cont.)

Two types of Emissions Units:

- Electric utility steam generating unit (EUSGU)
- All others (non-EUSGU)

BAE (cont.)

Not only are there two types of EUs, they can also be broken down into two categories, “New” and “Existing” Emission Units

BAE for EUSGU

For an EUSGU – the applicant must identify actual emissions that occurred during any consecutive 24-month period during the five years immediately preceding the date on which construction actually begins for a specific project, or the date a permit is issued if no construction is necessary.

BAE for EUSGU (cont.)

- Estimated future date of when construction will begin
- Adjust to allow for possible delays
- Documentation showing calculations of actual emissions
- CEMs data, MAERS reports, other source of emissions data may be used

BAE for EUSGU (cont.)

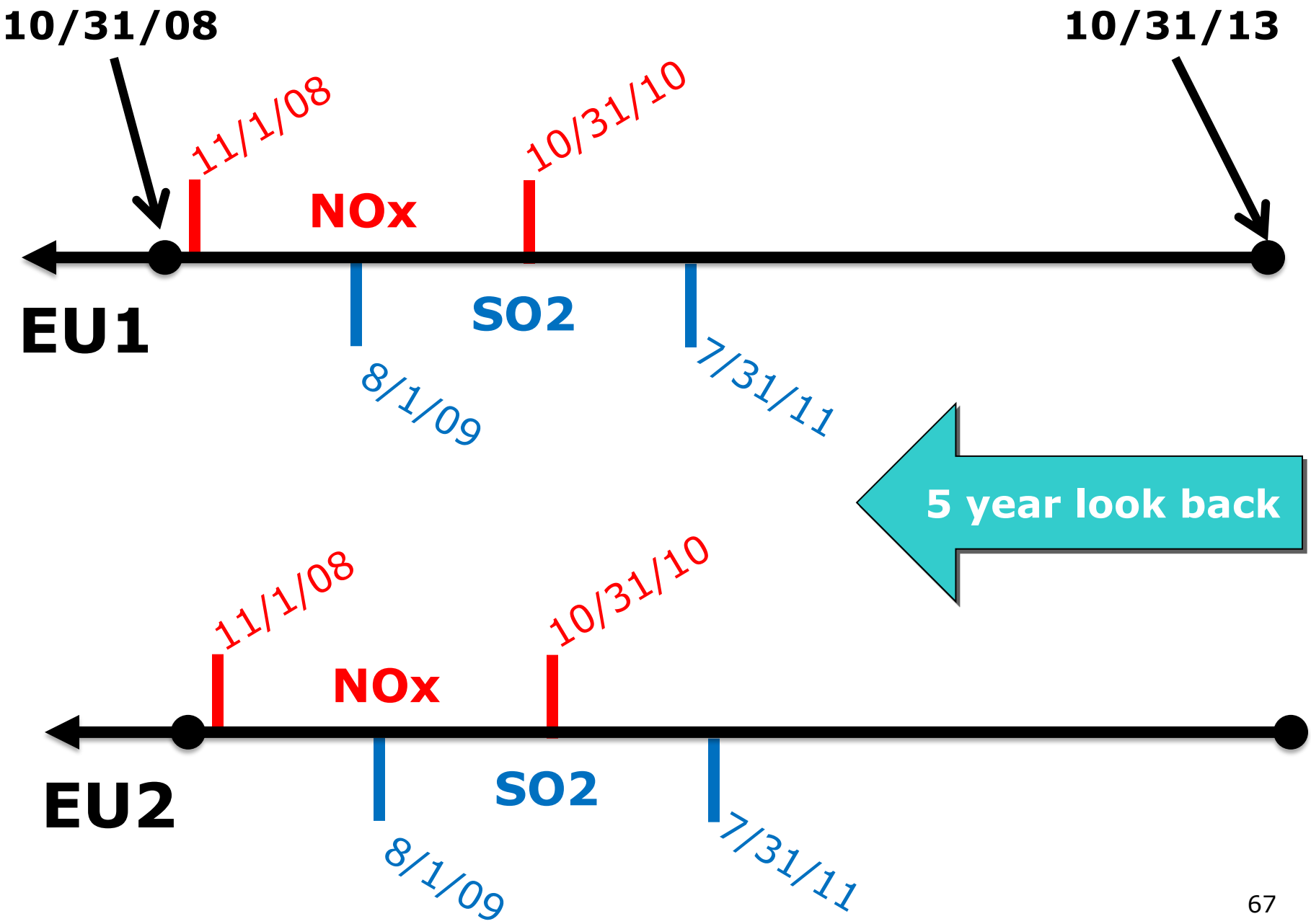
- Different 24-month period for different pollutants
- Must use the same 24-month period for each pollutant when multiple emissions units are involved in the project

BAE for EUSGU (cont.)

Example:

Two EUSGUs will be modified, both emit NOx, SO_2 and CO.
Start of construction is scheduled for October 31, 2013 so 5 year look back to ?

- Applicant chooses November 1, 2008 to October 31, 2010 for NOx for both emissions units
- August 1, 2009 to July 31, 2011 for SO_2 for both emissions units
- December 1, 2008 to November 30, 2010 for CO for both emissions units.


10/31/08
10/31/13
11/1/08
10/31/10
NOx
EU1
SO2
8/1/09
7/31/11
5 year look back
11/1/08
10/31/10
NOx
EU2
SO2
8/1/09
7/31/11

BAE for EUSGU (cont.)

Steps for BAE for an EUSGU

BAE is determined by:

1. Identifying the proper look back period for a project

BAE for EUSGU (cont.)

2. Selecting a 24-month period that meets all of the necessary criteria:
   - Common to all affected emissions units included in the BAE;
   - May be different for each pollutant; and
   - Sufficient documentation exists to calculate actual emissions and any adjustments to actual emissions that are necessary.

BAE for EUSGU (cont.)

3. Calculating the annual average emission rate
   - Actual emissions from all affected emissions units
   - Same 24-month period

BAE for EUSGU (cont.)

4. Adjust the calculated emissions
   - Non-compliant Emissions
   - Quantifiable Fugitive Emissions
   - Startup, Shutdown and Malfunction Emissions

BAE (cont.)

EUSGU to Non-EUSGU

BAE for Non-EUSGU

For a Non-EUSGU - BAE is the average actual emissions calculated over two consecutive years (i.e., 24 consecutive months) of actual operation.

- Consecutive 24-month period
- Ten years preceding:
  - Construction actually begins; or
  - Date a complete permit application is received

BAE for Non-EUSGU (cont.)

- Must possess adequate documentation for the selected period
- Must allow for adjustments
- Documentation that is missing or incomplete for any part of a 24-month period means a different period must be used

BAE for Non-EUSGU (cont.)

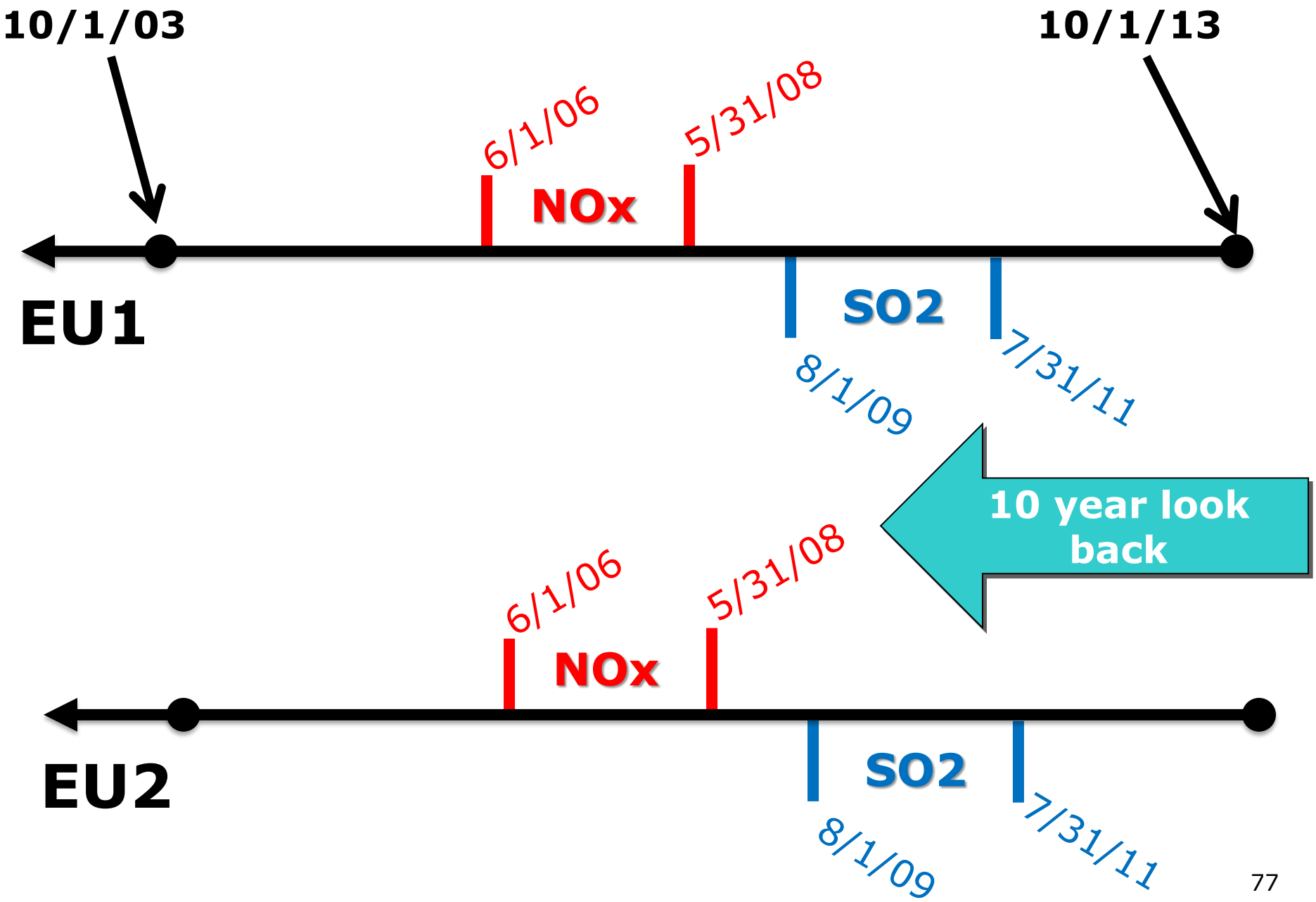
Same as EUSGU for selecting a 24-month period for each pollutant and each emission unit:

- One consecutive 24-month period for multiple emission units emitting the same pollutant(s)
- A different consecutive 24-month period can be used for each regulated NSR pollutant

BAE for Non-EUSGU (cont.)

Example:
Two emission units will be modified, both emit NOx, SO_2 and CO.
AQD received a complete application on October 1, 2013 so 10 year look back to October 1, 2003.

- Applicant chooses June 1, 2006 to May 31, 2008 for NOx for both emissions units
- August 1, 2009 to July 31, 2011 for SOx for both emissions units
- September 1, 2008 to August 31, 2010 for CO for both emissions units


10/1/03
10/1/13
6/1/06
5/31/08
NOx
SO2
8/1/09
7/31/11
EU1
10 year look back
6/1/06
5/31/08
NOx
SO2
8/1/09
7/31/11
EU2

BAE for Non-EUSGU (cont.)

BAE for a non-EUSGU must be adjusted downward to exclude any emissions that would have exceeded an emission limit with which the facility must currently comply, even if the limitation did not exist during the selected 24-month period.

BAE for Non-EUSGU (cont.)

- Fugitive emissions, if they can be quantified, must be included in the BAE.
- Also, emissions resulting from startup, shutdown and malfunctions must be included in the BAE.

BAE for Non-EUSGU (cont.)

Steps for a non-EUSGU BAE are determined by:

1. Identifying the proper look back period for a particular project.

BAE for Non-EUSGU (cont.)

2. Selecting a 24-month period that meets all of the necessary criteria:
   - Common to all affected emissions units included in the BAE;
   - May be different for each pollutant; and
   - Sufficient documentation exists to calculate actual emissions and any adjustments to actual emissions that are necessary.

BAE for Non-EUSGU (cont.)

3. Calculating the annual average emission rate:
   - Actual emissions from all affected Emission Units
   - Same 24-month period

BAE for Non-EUSGU (cont.)

4. Adjust the calculated emissions for:
   - Non-compliant emissions
   - Quantifiable fugitive emissions
   - Startup, shutdown and malfunction emissions
   - Regulations with which the facility must currently comply

Chapter 3

QUESTIONS?

Michigan Department of Environmental Quality

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Chapter 4: Applicability Tests Based on Emissions Changes

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Outline for Applicability Tests

- Types of Tests (P. 45)
- A2P (P. 45-46)
- A2A (P. 46-63)
  - Steps (P. 47-53)
  - A2A Example (P. 54-63)

PSD Applicability Tests

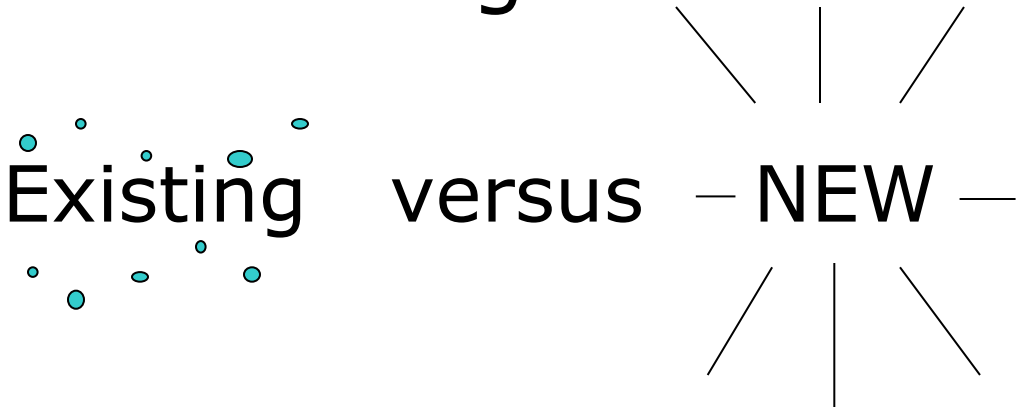
What are the applicability Tests?

- Actual-to-Potential (A2P)
- Actual-to-Projected-Actual (A2A)
- Hybrid

Applicability Test – A2P

A2P

- New or Existing Emission Units



A2P (cont.)

Potential to emit is defined in R 336.2801(hh) as:

"Potential to emit" means the **maximum capacity** of a stationary source to emit a pollutant under its physical and operational design. A physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is legally enforceable and enforceable as a practical matter by the state, local air pollution control agency, or United States Environmental Protection Agency. Secondary emissions do not count in determining the potential to emit of a stationary source.

A2P (cont.)

- The allowable emissions of an emissions unit after the proposed project represent that emissions unit's potential to emit.
- May take a permitted limit in order to avoid becoming subject to PSD.

A2P (cont.)

- If the sum of the allowable (potential) emissions for all emissions units affected by the project exceeds the BAE by greater than significant for any regulated NSR pollutant, the proposed project is subject to PSD; or
- If the sum is less than significant, not subject to PSD.

A2P (cont.)

A2P Example:

- Consider a process that emits 50 lbs/hr of PM10 and consistently operates at 7600 hours per year.
- The facility is an existing major stationary source.

A2P (cont.)

The BAE for the project is calculated as follows:

$$BAE = \frac{50 \text{ lbs/hr} * 7600 \text{ hrs/yr}}{2000 \text{ lbs/ton}}$$

BAE = 190 tons of PM10 per year

A2P Example (cont.)

- The permit allows 217.5 TPY (8700 hours of operation * 50 lb/hr)
- Project proposes to increase emissions from 50 to 60 lbs/hr

8700 hrs * 60 lb/hr = 261 TPY

This would increase the potential PM10 emissions from 217.5 TPY to 261 TPY

A2P Example (cont.)

For this project, using the A2P test would result in an increase of PM10 as demonstrated by the following equation:

261 TPY – 190 TPY = 71 TPY

A2P Example (cont.)

71 TPY is greater than significant for PM10 which is 15 TPY

This is a significant increase in emissions which could be subject to PSD for PM10 depending on the magnitude of the net emissions increase.

Applicability Test – A2A

Actual-to-Projected-Actual

A2A (cont.)

- The A2A test involves comparing projected actual emissions from all affected emissions units to the BAE from the affected emissions units.
- Involves future business activity

A2A (cont.)

R 336.2802(4)(c)

- The actual-to-projected-actual (A2A) applicability test may be used for projects that only involve existing emission units.

A2A (cont.)

The AQD follows the following 8 steps for completing the A2A process:

Step 1: Determine BAE

Step 2: Determine PAE

Step 3: Determine Excludable Emissions (EE)

A2A (cont.)

Step 4: Draw a Diagram (Optional)

Step 5: Determine Projected Emissions Increase (PEI)

Step 6: Compare PEI to Significant Levels

Step 7: Recordkeeping and Reporting Obligations

Step 8: Permit Conditions

A2A Steps

Step 1:Determine BAE

Baseline Actual Emissions are determined on a pollutant by pollutant basis.

A2A Steps (cont.)

Step 1: BAE - Continued

Baseline period depends on process being modified

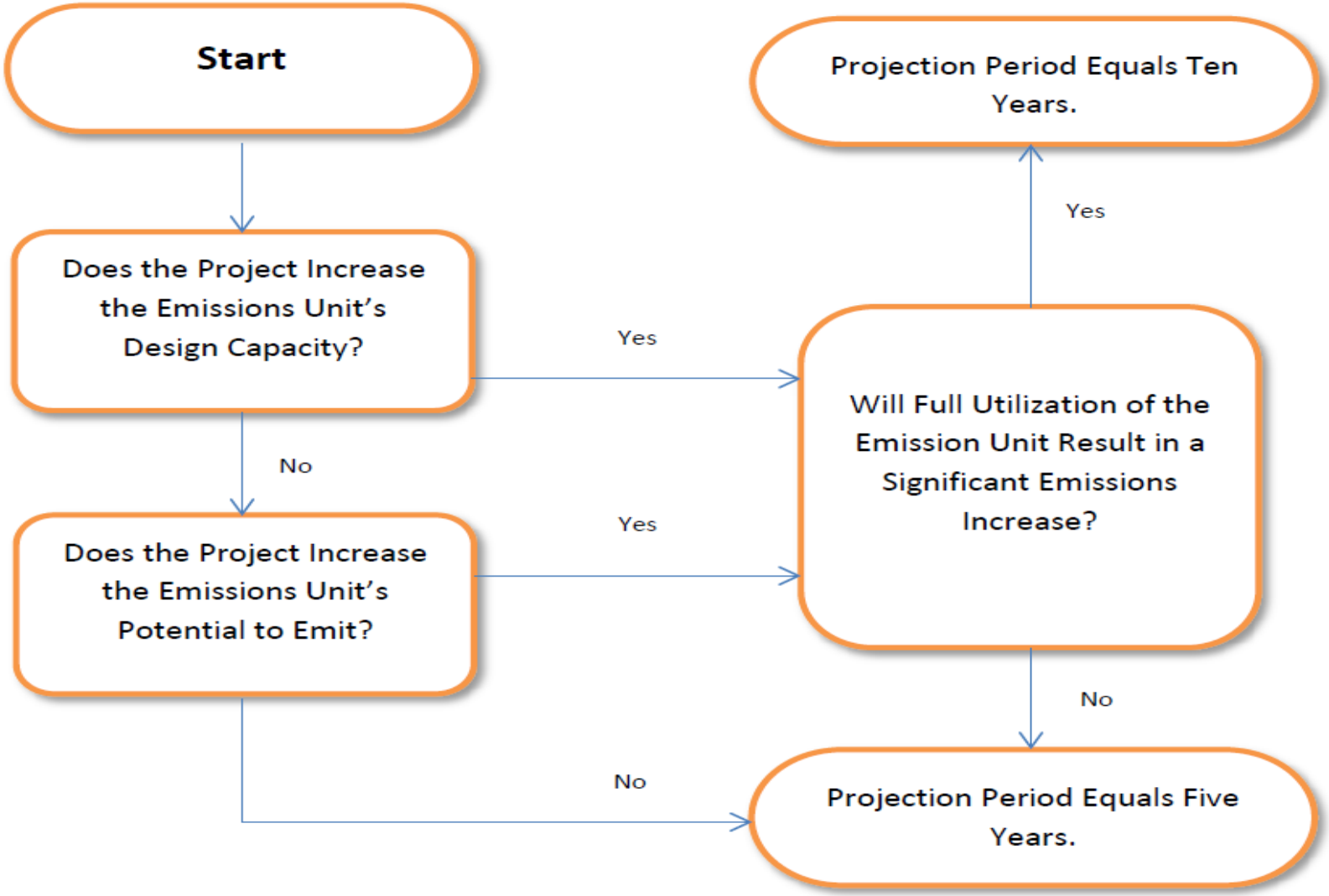
- EUSGU – 5 years
- Non-EUSGU – 10 years
- Must be 24-month consecutive time period, can be different for each pollutant

A2A Steps (cont.)

Step 2 – Determine the Projected Actual Emissions (PAE)

- Projection period begins the date the affected Emissions Unit(s) resume regular operation
- 5 or 10 years after resuming regular operations

A2A Steps (cont.)



A2A Steps (cont.)

Step 2 PAE – Continued

- Resuming regular operation means:
  - Construction complete
  - Initial shakedown complete

A2A Steps (cont.)

Step 2 PAE - Continued

- Default PAE = PTE
- PAE is defined in R 336.2801(ll)(ii) and includes the following:
  - Historical operational data
  - Company's own representations
  - Expected business activity
  - Highest projected business activity
  - Filings with state or federal regulatory authorities

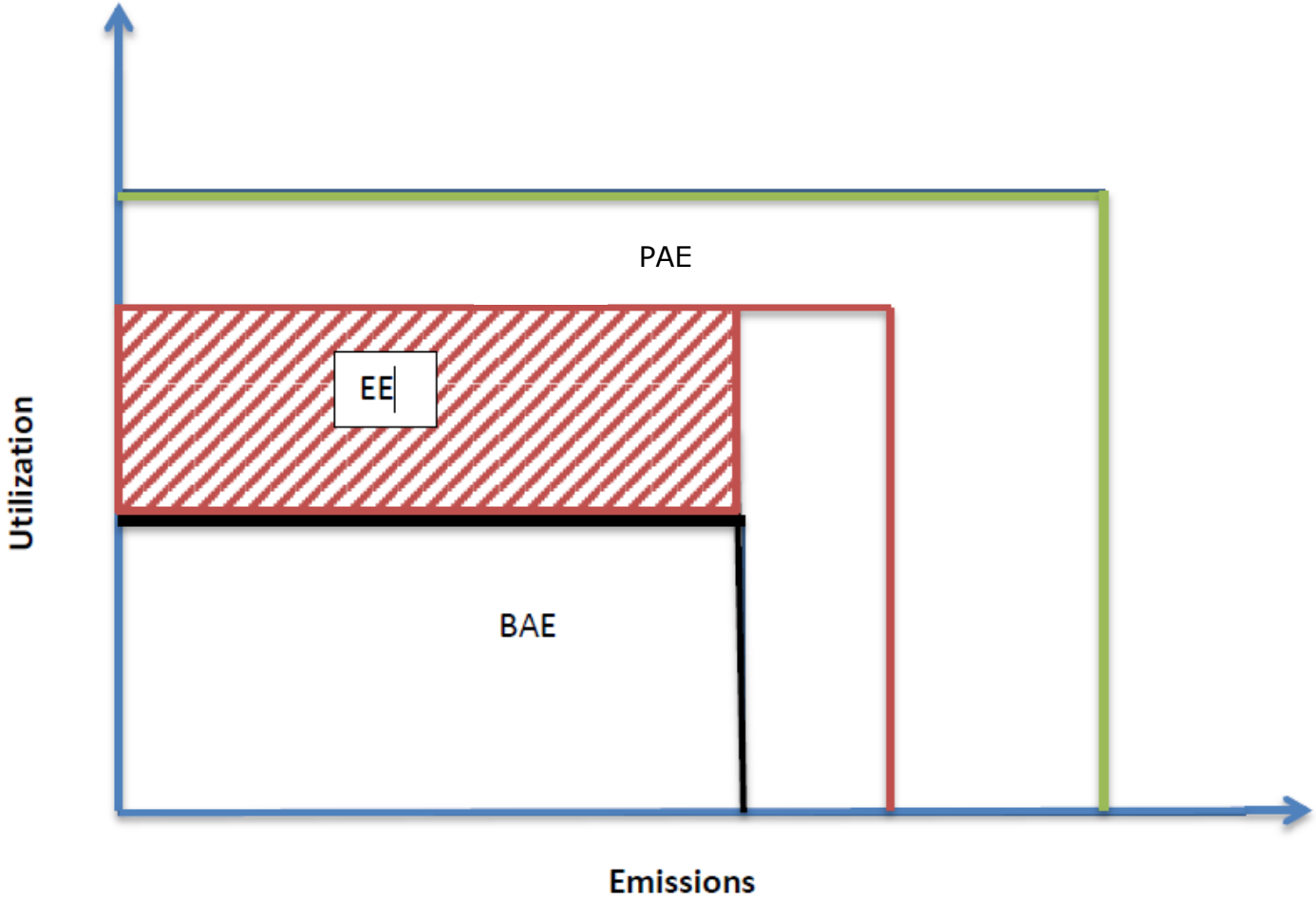
A2A Steps (cont.)

Step 3 – Excludable Emissions (EE)

- Default is zero EE,
- Provide basis for EE
- EE must have been achieved during the look back period, could have been accommodated during the baseline period, and the unit(s) is capable of accommodating them in the future

A2A Steps (cont.)

Step 4: Draw A Diagram (Optional)



A2A Steps (cont.)

Step 5: Determine Projected Emissions Increase (PEI)

Use the Equation:

$$PEI = PAE - BAE - EE$$

A2A Steps (cont.)

Step 6 – Compare PEI to Significant Levels for each pollutant

- If PEI is less than significant for each pollutant, then the project is not subject to PSD.
- If PEI is equal to or above significant for any pollutant, go through PSD Review or proceed to netting.

A2A Steps (cont.)

Step 7: Recordkeeping and Reporting

- R 336.2818(3) requires the following recordkeeping for all sources:

  1. Document and maintain on file the following information prior to beginning actual construction on the project:
     - A description of the project;
     - Identification of each affected emission unit;

A2A Steps (cont.)

Step 7: Recordkeeping and Reporting (cont.)

- A description of the applicability test used; including,
  - The BAE;
  - The PAE;
  - The amount of EE;
  - The reason for excluding that amount;
  - Any netting calculations, if applicable.

A2A Steps (cont.)

Step 7: Recordkeeping and Reporting (cont.)

2. Calculate annual emissions, in tons per year, at the end of each year following the date that normal operation resumes after completion of the project.

A2A Steps (cont.)

Step 7: Recordkeeping and Reporting (cont.)

Reporting requirements for projects subject to R 336.2818(3) vary, depend on the type of source.

A2A Steps (cont.)

Step 7: Recordkeeping and Reporting (cont.)

Reporting for Non-EUSGU Projects:

A report is only required for those years in which actual annual emissions exceed the BAE by more than the significant threshold and differ from the pre-construction projected emissions. Such a report for a non-EUSGU must include:

- The name, address and telephone number of the facility;
- The calculated annual emission; and,
- Any other information the owner or operator wishes to include in the report (e.g., an explanation why the emissions differ from the projection).

A2A Steps (cont.)

Step 7: Recordkeeping and Reporting (cont.)

Reporting for EUSGU Projects:

- Recordkeeping
  - A description of the project;
  - Identification of each affected emission unit;
  - A description of the applicability test used; including BAE, PAE, amount of EEs, reason for excluding that amount and netting calculations, if applicable.

A2A Steps (cont.)

Reporting for EUSGU Projects (cont.):

- A report of the emissions units annual emissions must be submitted to MDEQ within 60 days after the end of each year of the projection period.

A2A Steps (cont.)

Step 7: Recordkeeping and Reporting (cont.)

Reasonable Possibility:

- If there is a reasonable possibility that emissions could exceed significant after resuming normal operation following the completion of the project, then the facility is required to document the applicability determination and monitor future emissions of the regulated NSR pollutant.

A2A Steps (cont.)

Step 7: Recordkeeping and Reporting (cont.)

Reasonable Possibility is defined in R 336.2818(3)(f) and exists when:

- The projected actual emissions increase is equal to or greater than 50 percent of the applicable pollutant significant level;
- The projected actual emissions increase plus the excluded emissions is equal to or greater than 50 percent of the applicable significant level.

A2A Steps (cont.)

Step 8 – Permit Conditions

- Monitoring
- Emission Calculations
- PAE may not be included as an enforceable permit requirement
- Other conditions related to the A2A
- Control device
- 5 or 10 year calculation records

A2A (cont.)

A2A Example:

The following slides will go through the steps of the example found in the book starting on p. 54.

A2A Example (cont.)

Define the Project:

1. It is 2009 and an existing major stationary source wants to put low NOx burners (LNB) on two existing boilers (which are classified as non-EUSGUs).
2. The facility is also removing two existing back up boilers.
3. The facility is located in an area that is currently designated as attainment for all criteria pollutants subject to regulation under the CAA.

A2A Example (cont.)

What is the project?

- The project is a physical change in the operation of the two boilers (Low NOx burners) which affects NOx and CO emissions, no other equipment at the facility is being modified.

What about the two back up boilers*?*

- The two back up boilers only come into play if the project has to go through netting.

A2A Example - Step 1: Determine BAE

Emission Rates for Determining BAE

NSR Pollutant	Boiler 1 (lb/MMBtu)	Boiler 2 (lb/MMBtu)
CO	0.0276	0.0276
NOx	0.33	0.33
SO2	0.923*	0.905*
VOC	0.0033	0.0033
Lead	2.3E-5	2.3E-5
PM	0.0602*	0.1016*

*Emission rates are different for each boiler.

A2A Example – Step 1 (cont.)

Baseline Period and Heat Input Values

NSR Pollutants	Baseline Period	Combined Heat Input for Boilers 1 and 2 (MMBtu)
CO	June 05 to May 07	21,622,450
NOx	May 05 to April 07	21,018,182
SO2	Mar 05 to Feb 07	21,733,961
VOC	Jun 05 to May 07	21,622,450
Lead	Mar 05 to Feb 07	21,735,961
PM	Sept 06 to Aug 08	20,064,699

A2A Example – Step 1 (cont.)

Baseline actual emissions:

NSR Pollutants	Time Period	Combined Heat Input for Boilers 1 and 2 (MMBtu)	BAE (tons/year)
CO	June 05 to May 07	21,622,450	298
NOx	May 05 to April 07	21,018,182	3,468
SO2	Mar 05 to Feb 07	21,733,961	10,451
VOC	Jun 05 to May 07	21,622,450	30.3
Lead	Mar 05 to Feb 07	21,735,961	0.25
PM	Sept 06 to Aug 08	20,064,699	582.2

A2A Example – Step 1 (cont.)

Sample Calculation for BAE:

Emission Rate x Heat Input/2000 = TPY

$$\text{CO BAE} = \frac{0.0276 \text{ lb/MMBtu} \times 21{,}622{,}450 \text{ MMBtu/yr}}{2000 \text{ lb/ton}}$$

CO BAE = 298 TPY

A2A Example - Step 2: Determine PAE

Determine the Projected Actual Emissions (PAE)

- Project the heat input with the LNB system for a 10 year period.
- Pick the highest year – the applicant provided a 10 year projection period and the highest heat input rate was determined to be 23,489,348 MMBtu/year in 2015.

Note: Only CO and NOx are expected to change due to the addition of the LNBs, but all pollutants emitted from the boilers must be in the demonstration because of increased utilization due to the project could cause a significant increase for other pollutants.

A2A Example – Step 2 (cont.)

Emission Rates with LNB:

NSR Pollutant	Boiler 1 (lb/MMBtu)	Boiler 2 (lb/MMBtu)
CO	0.17	0.17
NOx	0.30	0.30
SO2	0.923*	0.905*
VOC	0.0033	0.0033
Lead	2.3E-5	2.3E-5
PM	0.0602*	0.1016*

* Emission rates are different for each boiler.

A2A Example – Step 2 (cont.)

Projected Actual Emissions:

NSR Pollutants	Post-Change Emission Rates (lb/MMBtu)	Combined Heat Input for Boilers 1 and 2 (MMBtu/year) From 10 Year Projection: Used 2015	Combined PAE (Tons/yr)
CO	0.17	23,489,348	1997
NOx	0.30	23,489,348	3523
SO2	0.923, 0.905*	23,489,348	10,730
VOC	0.0033	23,489,348	38.8
Lead	2.3E-5	23,489,348	0.27
PM	0.0602, 0.1016*	23,489,348	961.7

* Emission rates are different for each boiler.

A2A Example – Step 2 (cont.)

Sample Calculation for PAE:

Emission Rate x Heat Input/2000 = TPY

$$\text{CO PAE} = \frac{0.17 \text{ lb/MMBtu} \times 23{,}489{,}348 \text{ MMBtu/yr}}{2000 \text{ lb/ton}}$$

CO PAE = 1997 TPY

A2A Example - Step 3: Excludable Emissions

Determine the Excludable Emissions:

- The applicant projected the heat input (future boiler utilization) without the LNB systems for a 10 year period.
- The highest year was determined to be 2013 with a combined boiler maximum projected heat input rate of 23,408,885 MMBtu/year.

A2A Example - Step 3: Excludable Emissions (cont.)

Determine the Excludable Emissions (cont.):

- Because future demand shows a trend towards increased utilization of the boilers and the boilers are capable of accommodating the increased heat input, the EE can be determined using the pre-LNB projected heat input and the baseline emission rates for each pollutant (except for NOx).

- This is allowed because this level of utilization was achieved on a short term basis at some point during the baseline year, i.e. – the boilers operated at a higher heat input on a short term basis during the baseline period that is the equivalent to the maximum projected heat input on an annual basis that is unrelated to the project.

A2A Example - Step 3 (cont.)

Level of Emissions that Could have been Accommodated

NSR Pollutants	Emission Rate (lb/MMBtu)	Combined Heat Input for Boilers 1 and 2 (MMBtu/year)	Could Have Accommodated (Tons/yr)
CO	0.0276	23,408,885	323
NOx	0.30	23,408,885	3511
SO2	0.923, 0.905*	23,408,885	10698
VOC	0.0033	23,408,885	38.6
Lead	2.3E-5	23,408,885	0.27
PM	0.0602, 0.1016*	23,408,885	959.4

*Different emission rates for each boiler

A2A Example - Step 3 (cont.)

Sample Calculation for Could Have Accommodated for CO:

Emission Rate x Heat Input/2000 = TPY

If project did not occur:

$$CO = \frac{0.0276 \text{ lb/MMBtu} \times 23{,}408{,}885 \text{ MMBtu/yr}}{2000 \text{ lb/ton}}$$

CO (No Project) = 323 TPY

A2A Example - Step 3 (cont.)

Excludable Emissions for this Project:

NSR Pollutants	Could Have Accommodated	BAE	EE (Tons/yr)
CO	323	298	25
NOx	3511	3,468	43
SO2	10698	10,451	247
VOC	38.6	30.3	8.3
Lead	0.27	0.25	0.02
PM	959.4	582.2	377.2

A2A Example - Step 3 (cont.)

Sample Calculation for determining EE for CO:

CO (No Project) = 323 TPY, could have accommodated

CO EE = CO could have accommodated – CO BAE

323 TPY – 298 TPY (BAE) = 25 TPY

A2A Example - Step 3 (cont.)

Note 1:

The NOx emission rate used for calculating EE is not the baseline emission rate of 0.33 lb/MMBtu but the projected actual emission rate of 0.30 lb/MMBtu because emissions above the projected actual emission rate can not be excluded.

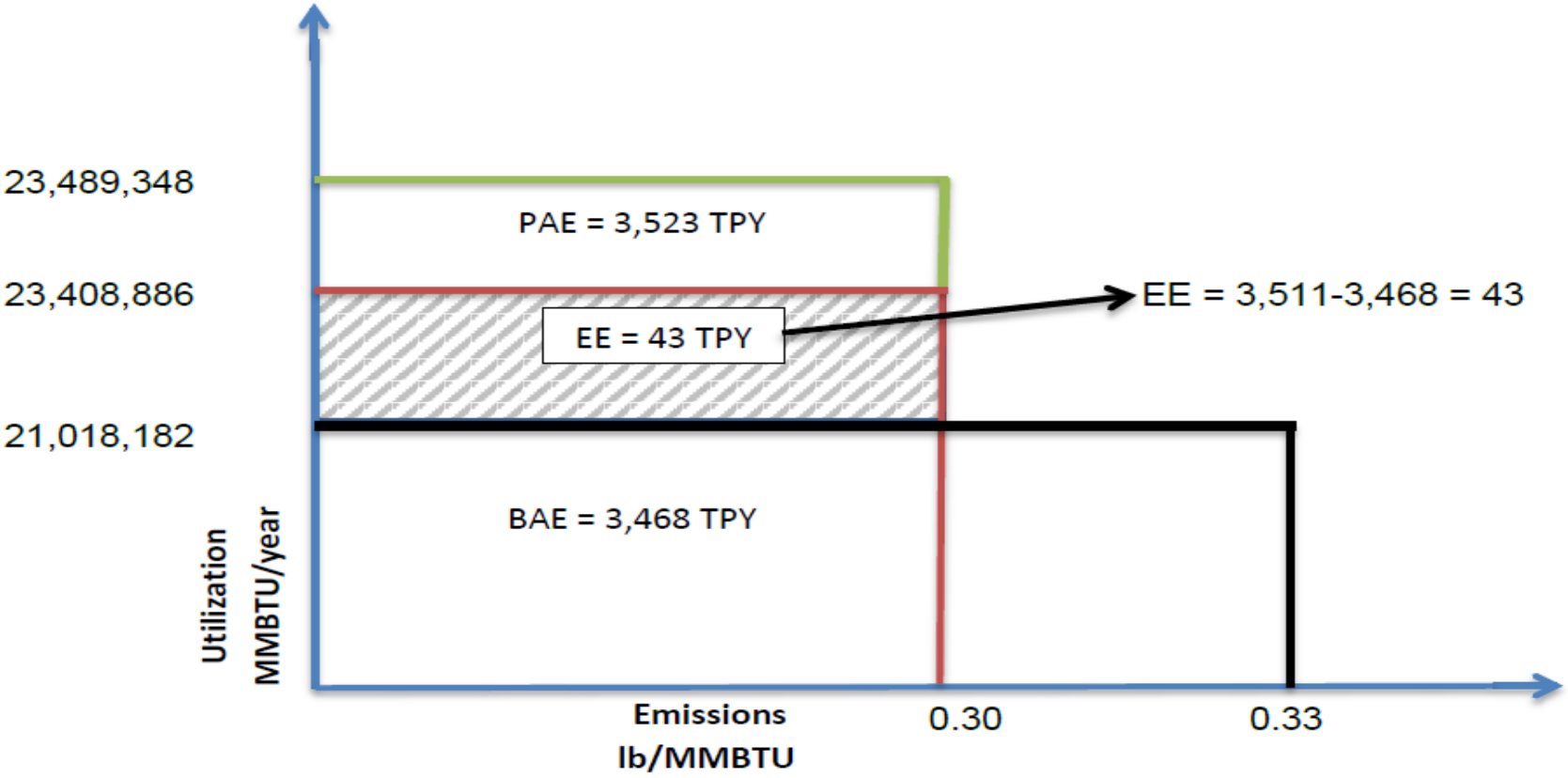
A2A Example - Step 3 (cont.)

Note 2:

The CO emission rate is the baseline emission rate of 0.0276 lb/MMBtu because the emissions are directly related to the project (increase in CO emission rate) and therefore, can not be excluded.

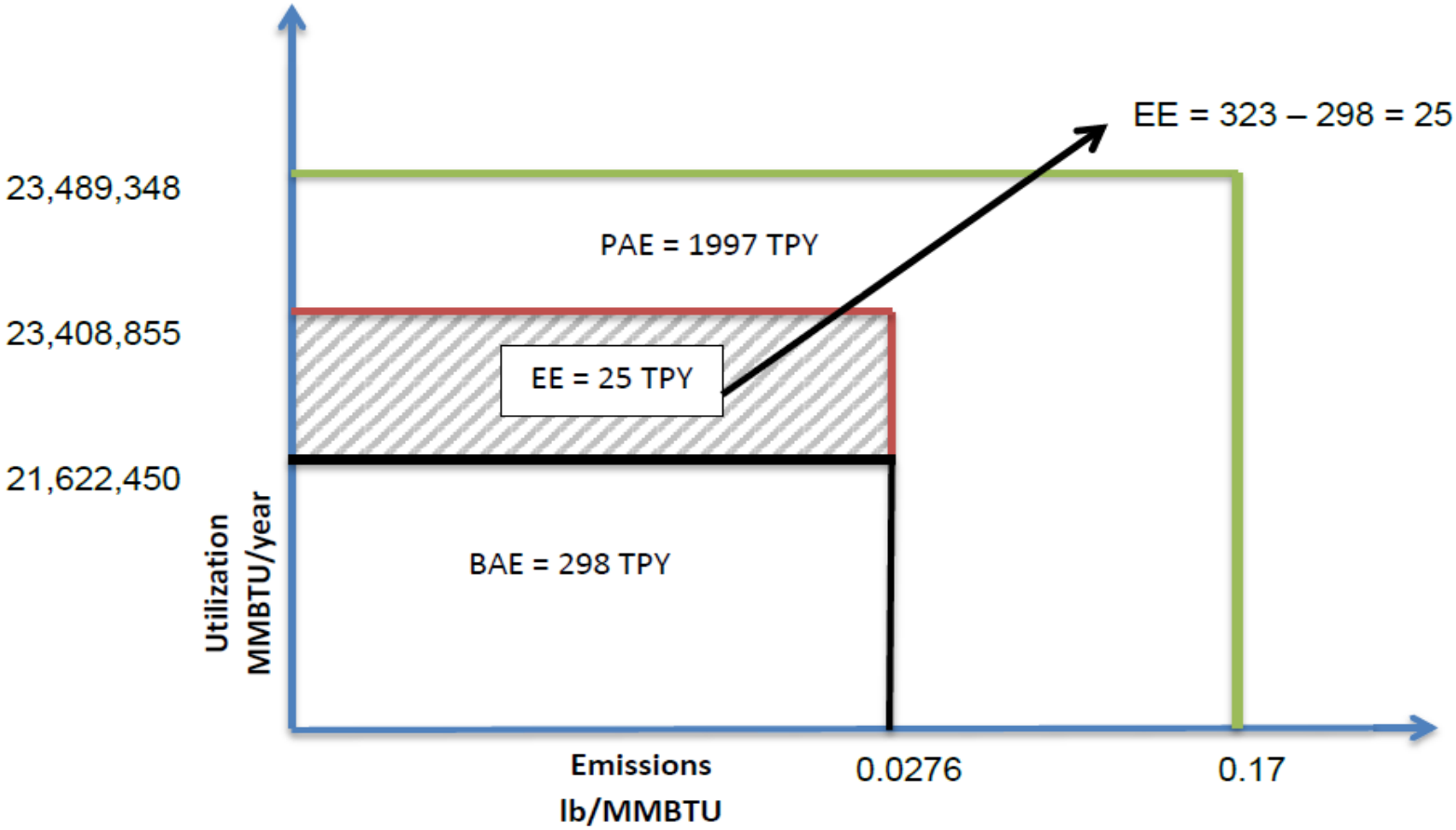
A2A Example - Step 4: Draw Diagram for NOx

Example 1 – NOx



A2A Example - Step 4: Draw Diagram for CO

Example 1 – CO



A2A Example - Step 5: Determine Projected Emissions Increase

Projected Emissions Increase (PEI)

PEI = PAE – BAE – EE

As previously defined:

PAE = Projected Actual emissions

BAE = Baseline Actual Emissions

EE = Excludable Emissions

A2A Example - Step 5 (cont.)

Projected Emissions Increases Compared to Significant Levels:

NSR Pollutants	BAE (TPY)	EE (TPY)	PAE (TPY)	PEI = PAE – BAE – EE (TPY)	Significant Level (TPY)	Subject to PSD Review*
CO	298	25	1,997	1,674	100	Yes*
NOx	3,468	43	3,523	12	40	No
SO2	10,451	247	10,730	32	40	No
VOC	30.3	7.7	38.8	0.8	40	No
Lead	0.25	0.02	0.27	-0-	0.6	No
PM	582.2	377.2	961.7	2.3	25	No

* Provided cannot net out on a facility wide basis.

A2A Example - Step 5 (cont.)

Sample Calculation for determining Projected Emissions Increase for CO:

1997 TPY – 298 TPY – 25 TPY = 1674 TPY

A2A Example - Step 6: Compare PEI to Significant Thresholds

As seen in the table for Step 5, only CO PEI is greater than the significant level, therefore, only CO is subject to PSD review for this project.

If not for the A2A test, other pollutants would have been subject to PSD review.

A2A Example - Step 7: Recordkeeping and Reporting due to Reasonable Possibility

SO_2 PEI is greater than 50% of significant threshold

- Recordkeeping and reporting for SO_2 emissions are required as described by R 336.2818(3)(a) to (e) due to reasonable possibility.

All other pollutants that are less than 50% of significant, no records for reasonable possibility are required.

A2A Example – Step 8: Permit Conditions

- Because SO_2 is greater than 50% of significant, conditions are required as described by Rule 1818(3)(a) to (e) due to reasonable possibility.
- Addition of Low NOx burners need to be enforceable per Rule 910.
- Conditions for CO including emission limits for PSD BACT are required because the increase in CO was greater than significant.

Chapter 4

QUESTIONS?

Michigan Department of Environmental Quality

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Chapter 5: Netting

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Outline for Netting

- Netting (p. 67)
- Steps (p. 68-70)
- Netting Example (p. 71-73)

Netting

If a project results in a significant increase, what are your choices:

- Go through PSD review for each regulated NSR pollutant that is above significant
- Go through netting to potentially "net out" of PSD requirements for some or all of the pollutants

Netting (cont.)

The process of evaluating a net emissions increase includes:

- Quantifying all recent (contemporaneous) increases and decreases in actual emissions at the facility
- Determining if they are creditable

Netting (cont.)

A contemporaneous period is:

- The time which precedes the commencement of construction of a new or modified emission unit
- Five years prior to the start of construction, plus the time it takes to complete construction and startup has occurred

Netting (cont.)

Eight steps to netting are:

1. Identify the contemporaneous period
2. Determine each physical change, or change in the method of operation that occurred, or will occur, during the contemporaneous period with a corresponding increase or decrease in actual emissions.

Netting (cont.)

Eight Steps (cont.)

3. Evaluate each change on the list to identify only those that are creditable.
4. List each remaining creditable, contemporaneous change.
5. Separately calculate the BAE for each creditable, contemporaneous change.

Netting (cont.)

Eight Steps (cont.)

6. Identify the post-change potential emissions for each emissions unit affected by each creditable, contemporaneous change.
7. Calculate the emissions increase or decrease for each emissions unit as post-change minus BAE.

Netting (cont.)

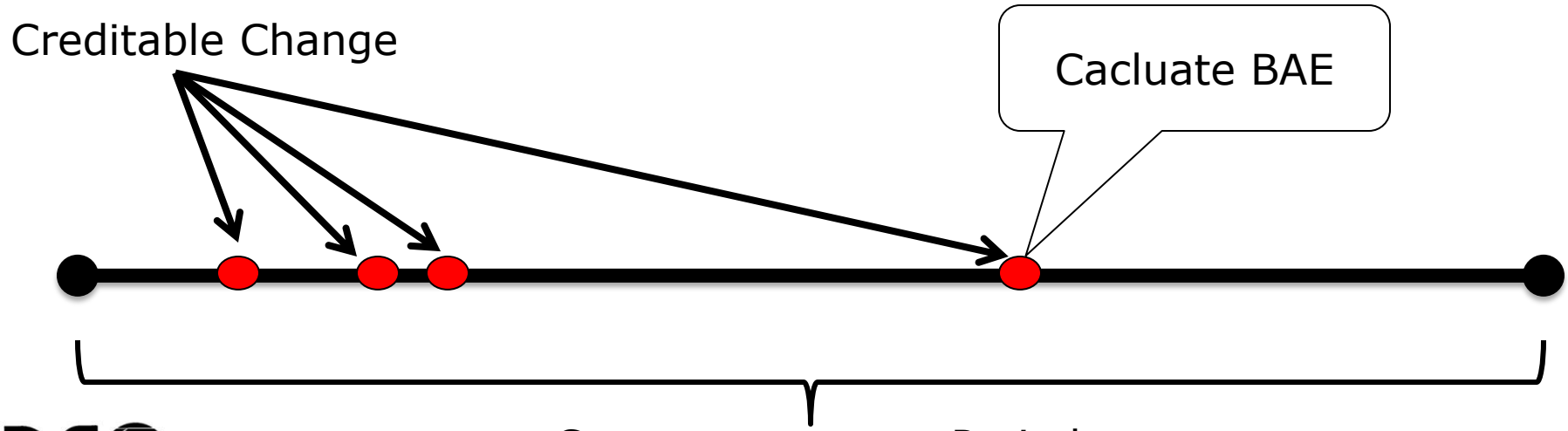
Eight Steps (cont.)

8. Sum all creditable emission increases and decreases with the emissions increase from the proposed project. For each pollutant where the sum is less than significant, then the project is not subject to PSD review for these regulated NSR pollutants.

Netting (cont.)

The basis for the eight steps is contained in R 336.2801(ee) which is the definition for:

"net emissions increase"



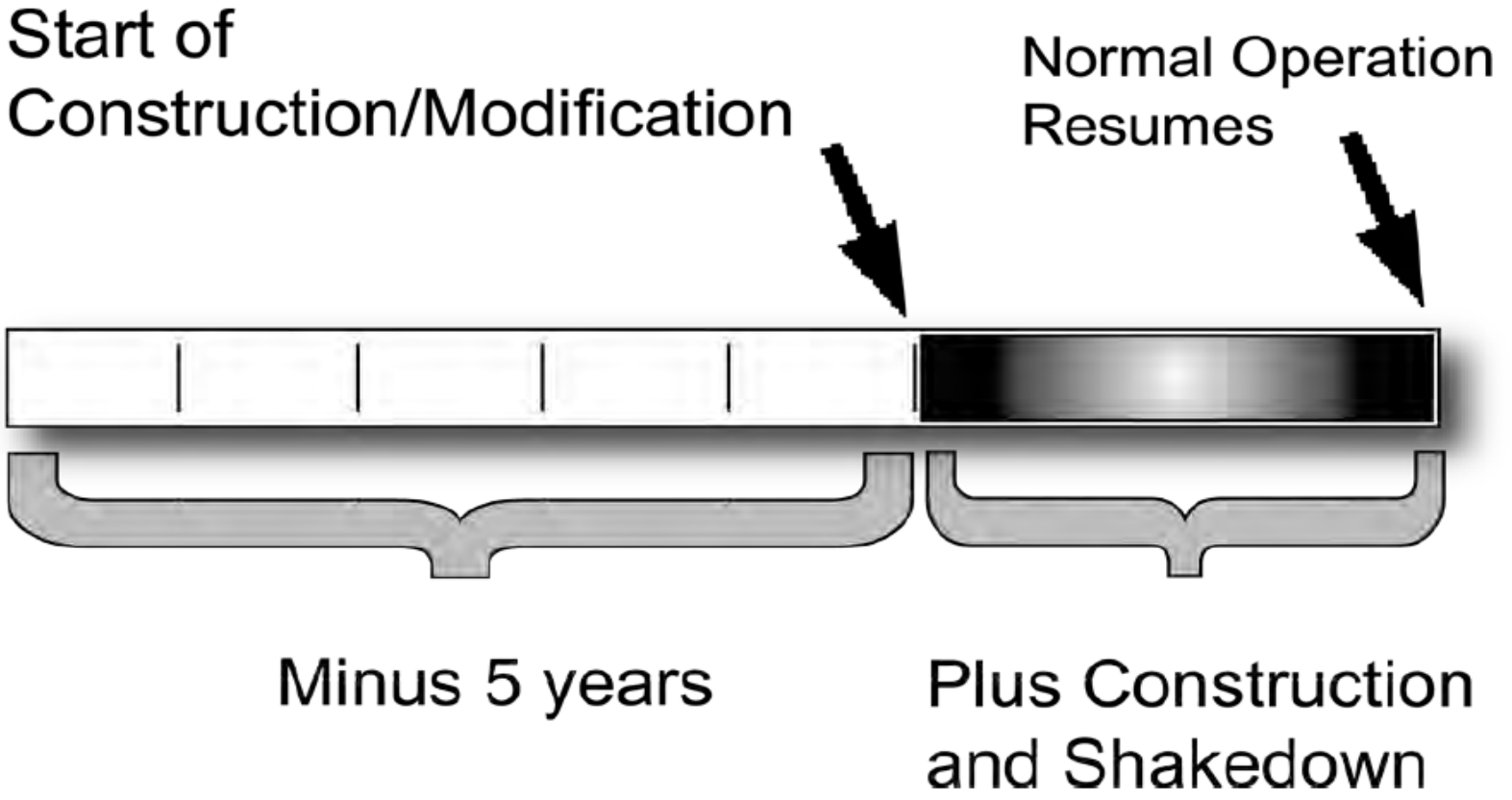
Netting (cont.)

Step 1: Identify the Contemporaneous Period

- Begins five years prior to the start of construction on the proposed project
- Ends when the project begins initial operation

Netting (cont.)

Contemporaneous Period



Netting (cont.)

Step 2: Determine the Creditable Changes

There are restrictions on which contemporaneous changes can be credited in determining net emissions increases and decreases.

Netting (cont.)

Step 2 (cont.)

To be creditable, a contemporaneous emissions decrease must:

- Be federally enforceable
- Take place prior to the emissions increase from the project with which it is being netted
- Must be permanent

Netting (cont.)

Step 3: Evaluate the Creditable Changes

- Did the changes (increases and decreases) occur during the contemporaneous period?
- Were they relied upon in the issuance of a PSD Permit?
- Are they creditable?

Netting (cont.)

Step 4: List the Creditable Changes

Make a list of all the creditable increases and decreases that occurred during the contemporaneous period.

Netting (cont.)

For example, a project has a start up date of approximately April 21, 2014, construction started on December 1, 2013.

- What is the contemporaneous period?

  December 1, 2008 to April 21, 2014

- Now list the changes that occurred during that time period

Netting (cont.)

Step 5: Determine BAE for Creditable Changes

As described in Chapter 3, BAE are the calculated annual average emission rate based on the actual emissions from the affected emissions units determined over a consecutive 24-month period.

Netting (cont.)

Step 5 (cont.)

- The five or ten year look back period begins at the date of each contemporaneous change
- Adequate documentation must exist to calculate actual emissions

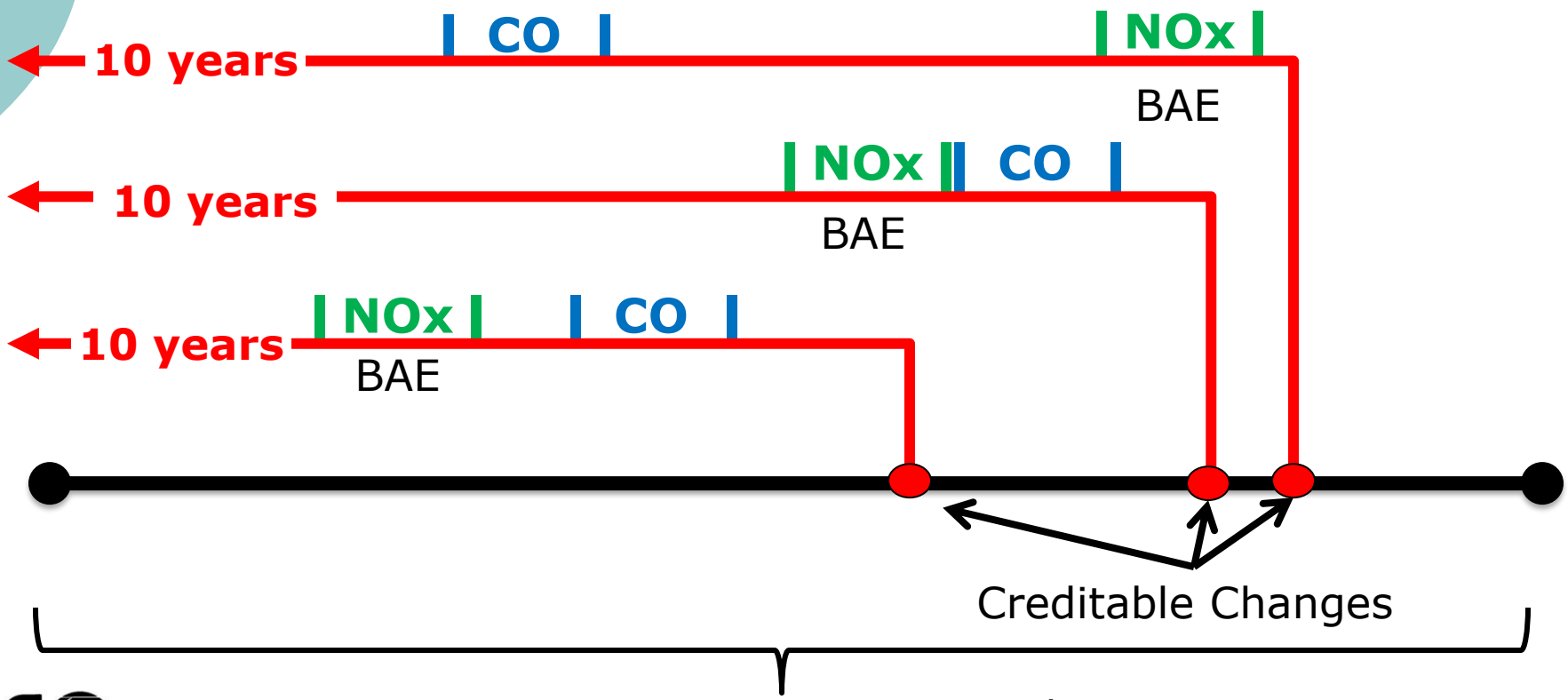
Netting (cont.)

Step 5 (cont.)

BAE for creditable, contemporaneous emissions changes:

- Not required to use a single 24-month period to determine the BAE
- Each regulated NSR pollutant emitted from each emission unit may use a different 24-month period

Netting (cont.)



Netting (cont.)

Step 6: Determine the Post-Change Potential Emissions for Creditable Changes

- Physical change or change in the method of operation
- In Michigan, most of these types of changes require a PTI

Netting (cont.)

Step 7: Determine the Magnitude of Each Creditable Change

- Difference between the post-change potential and pre-change BAE
  - Post-change > BAE = increase
  - Post-change < BAE = decrease

Netting (cont.)

Step 8: Determining the Net Emissions Change

- All creditable contemporaneous emissions changes must be accounted for at the stationary source for each regulated NSR pollutant
- Creditable increases and decreases are added to the emissions increase from the project for which the netting analysis is being conducted

Netting (cont.)

Example

An existing major stationary source (non-EUSGU) plans to modify a process (process line A) which will increase production at the facility. The project will cause an increase in CO by 110 tons per year, SO2 by 35 tons per year and NOx by 50 tons per year from process line A.

The application was submitted in May 2013 and construction is planned to be completed by the end of 2014.

Netting (cont.)

Example (cont.)

During May 2011, the applicant removed two old boilers.

In December 2012, the company was permitted to install three process heaters with combined emissions of 8 TPY of NOx, 40 TPY of CO and 5 TPY of SO2. The installation of the process heaters is not related to the modification of process line A. While permitted in December 2012, the applicant did not begin construction of these heaters until August 2013.

Netting (cont.)

Example (cont.)

Additionally, in June 2008, the company began the process of shutting down process line B and completed the removal of the line in August 2008.

No other changes have occurred at the facility in the last 15 years and they have not had any enforcement issues.

Netting (cont.)

Example (Continued)

BAE for Process Line A, as provided by the applicant:

SO2 = 90 TPY (Sept. 2008 to Aug. 2010)

NOx = 65 TPY (Sept. 2008 to Aug. 2010)

CO = 230 TPY (Sept. 2008 to Aug. 2010)

Netting (cont.)

Example (Continued)

PAE after the project for Line A:

SO2= 125 TPY (90 + 35 = 125)

NOx = 115 TPY (65 + 50 = 115)

CO = 340 TPY (230 + 110 = 340)

Netting (cont.)

Example (cont.)

Change in Emissions for the project:

35 TPY of SO2 < 40 TPY, not significant

50 TPY of NOx > 40 TPY, significant emissions increase

110 TPY of CO > 100 TPY, significant emissions increase

Netting (cont.)

Example (cont.)

Step 1: Identify Contemporaneous Period

Construction is projected to begin shortly after permit issuance on September 1, 2013, therefore, the contemporaneous period begins on September 1,2008 and ends when Line A has begun normal operation.

Netting (cont.)

Example (cont.)

Step 2: Determine all Emission Changes During Contemporaneous Period

- Removed the two boilers in 2011;
- Began installation of the three process heaters in August 2013;
- Process Line B was removed in June 2008.

Netting (cont.)

Example (cont.)

Step 3: Identify Changes that Caused Creditable Emission Changes

- Boilers removed in October 2011
- Heaters permitted in 2012, construction commenced in August, 2013

Netting (cont.)

Example (cont.)

Step 4: List the Changes that Cause Creditable Emission Changes

In Step 3, both the removal of the boilers and the addition of the heaters were deemed as the only creditable changes at the facility during the contemporaneous period.

Netting (cont.)

Example (cont.)

Step 5: Establish the BAE for the Creditable Changes

Both creditable, contemporaneous changes in emissions were for non-EUSGUs. Therefore, BAE is determined by the following:

Netting (cont.)

Example (Step 5: cont.)

1. Identify the proper look back period for the emissions unit. For netting purposes for a non-EUSGU, this is the ten year period immediately preceding the earlier of the date on which construction actually begins or when a complete application is submitted, but cannot include any period prior to November 15, 1990.

Netting (Cont.)

Example (Step 5: Cont.)

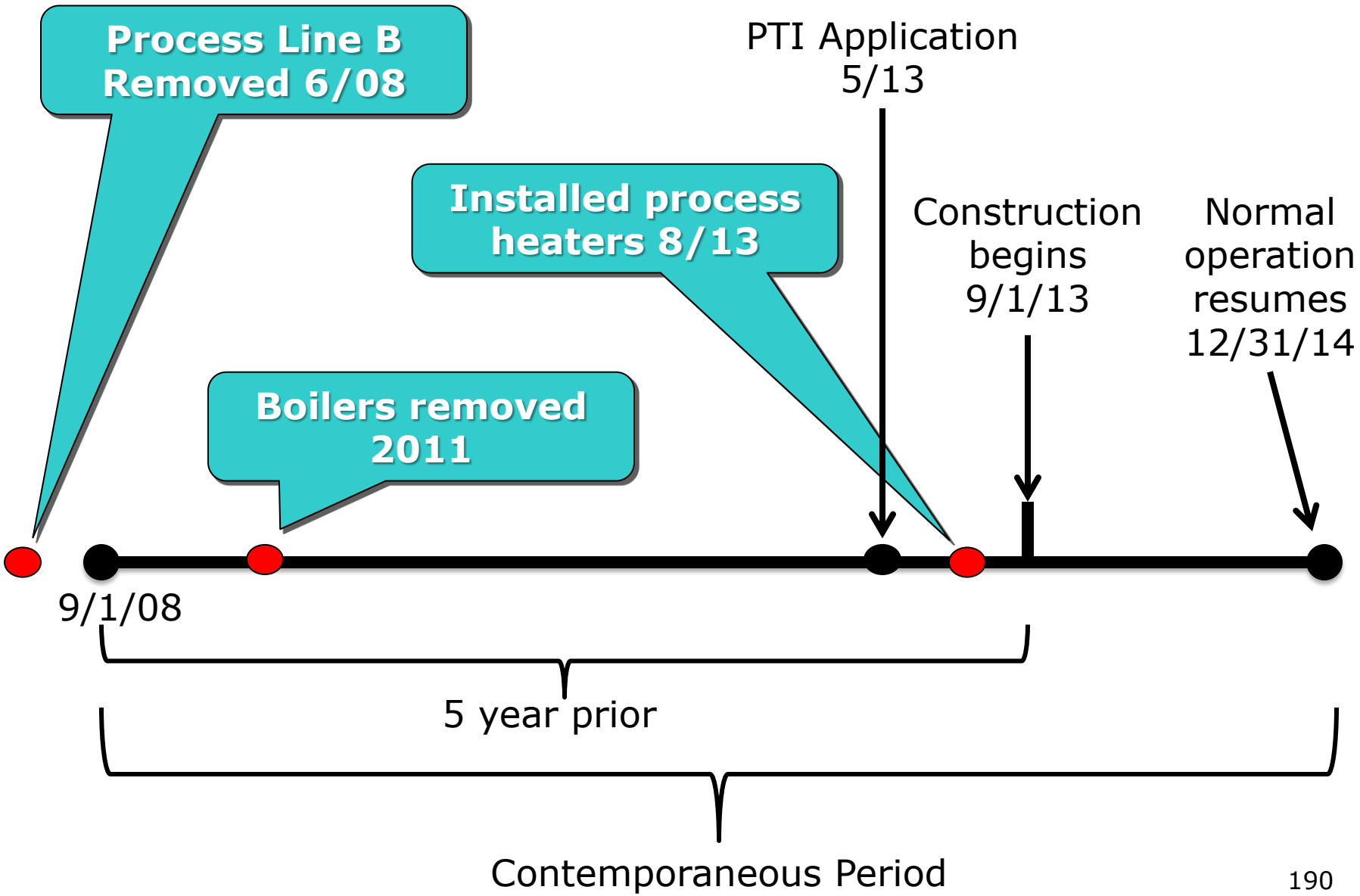
2. Select a 24-month period that meets all of the necessary criteria:
   - May be different for each affected emissions unit;
   - May be different for each pollutant; and
   - Sufficient documentation exists to calculate actual emissions and any adjustments

Netting (cont.)

Example (Step 5: cont.)

3. Calculate the annual average emission rate based on the actual emissions from the emissions unit during the selected 24-month period.
4. Adjust the calculated emissions for non-compliant emissions, quantifiable fugitive emissions, startup, shutdown and malfunction emissions, and for regulations with which the facility must currently comply.

Netting Example



Netting (cont.)

Example (Step 5: cont.)

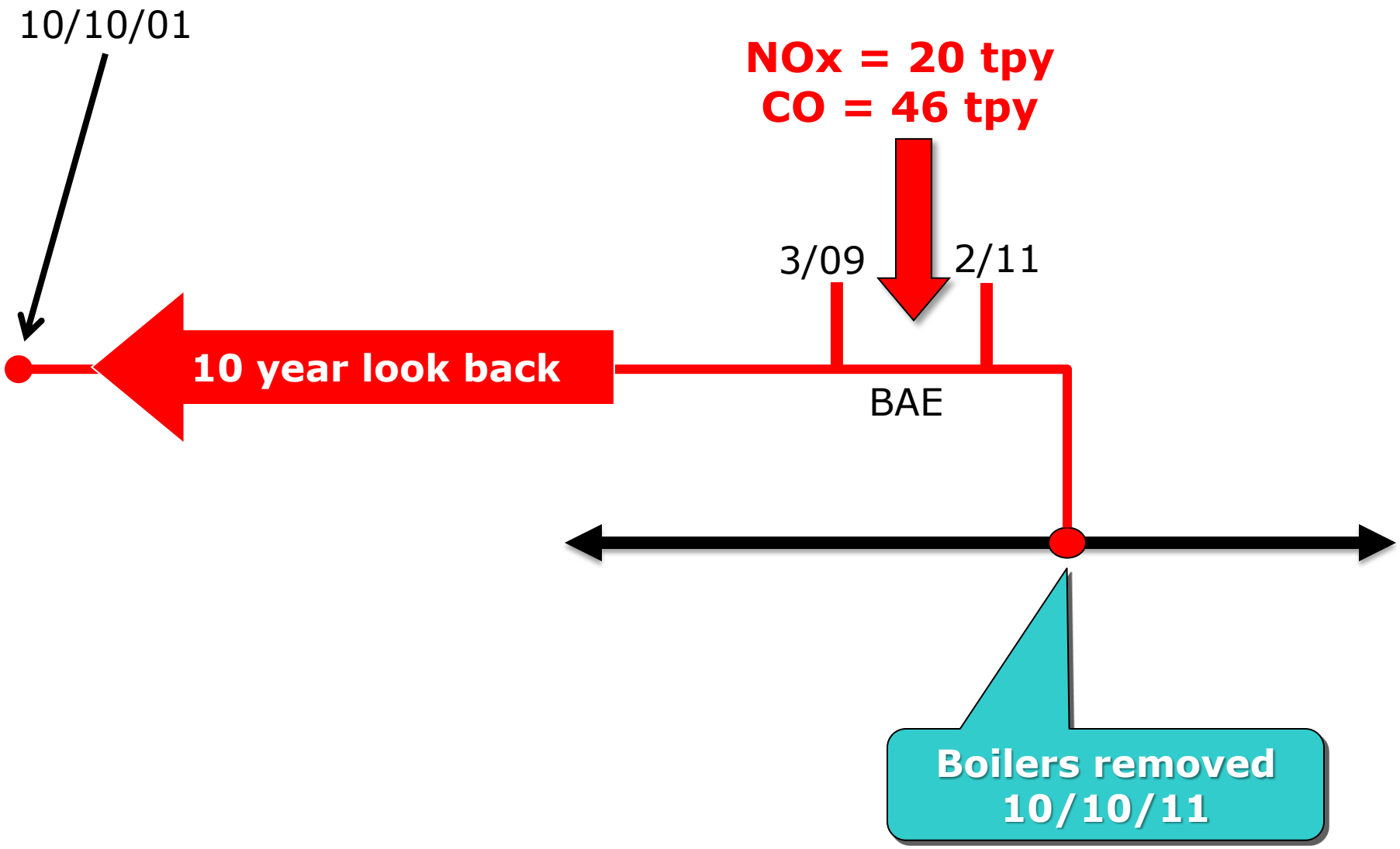
Boilers:

The boilers were removed October 10, 2011, so the ten year look back period begins October 10, 2001.

BAE for two Boilers for CO and NOx:

Based on actual fuel usage, from March 2009 to February 2011, emissions were determined to be 46 TPY of CO and 20 TPY of NOx. This matches what was reported to MAERs.

Netting Example



Netting (cont.)

Example (Step 5: cont.)

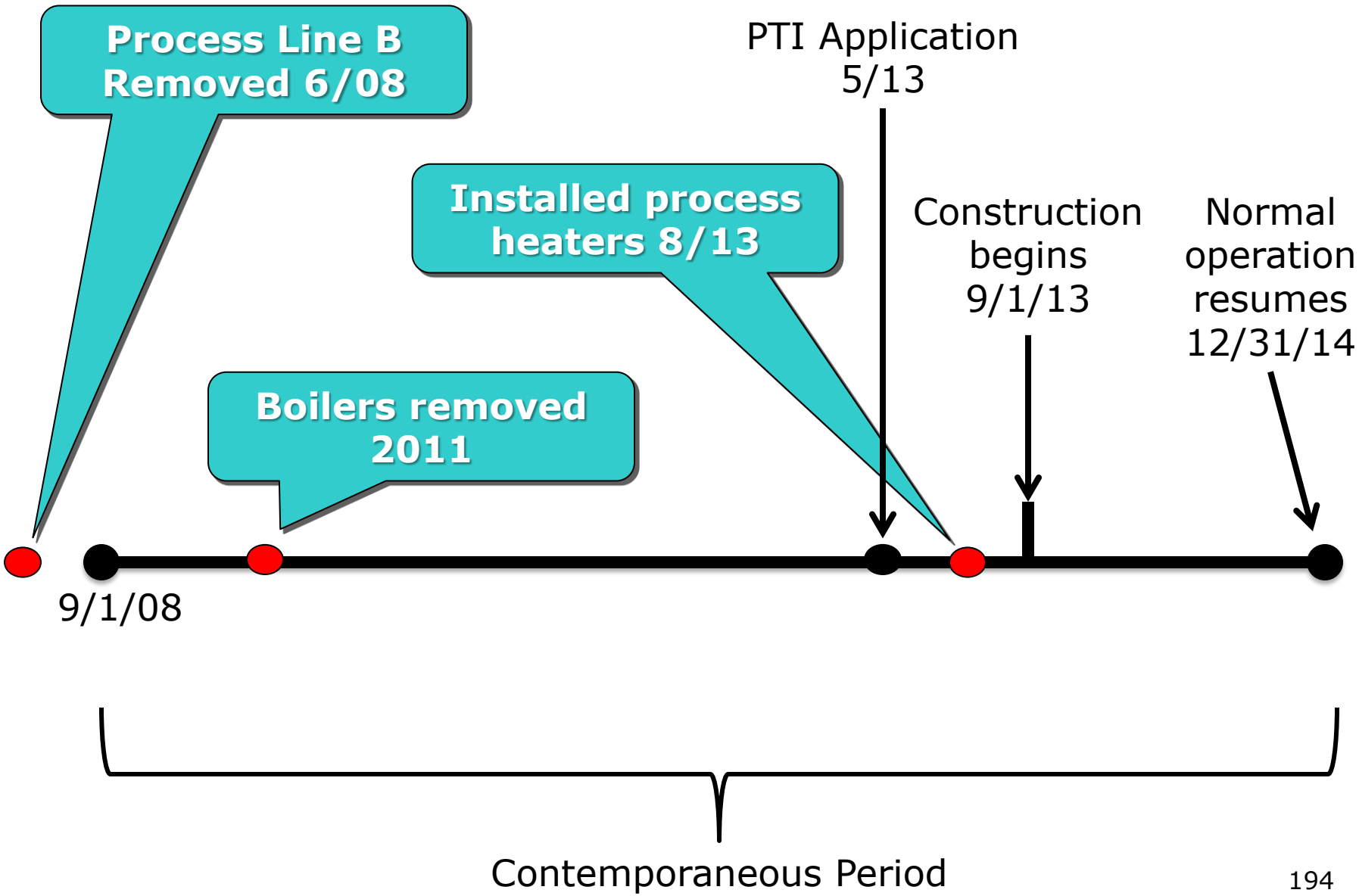
Process Heaters

The process heaters were installed in August 2013; therefore, they have not begun operation as of the submittal of this PTI application.

BAE needs to be determined for CO and NOx:

No baseline has been established for the process heaters because they have not yet operated therefore, the BAE for each pollutant is zero.

Netting Example



Netting (cont.)

Example (cont.)

Step 6: Determine the Potential to Emit for Creditable Changes

- Because the boilers have been removed, the potential to emit after the change to the A line for the boilers will be zero.
- For the process heaters, they have not yet operated; therefore, the permitted limit is used as the PTE.

Netting (cont.)

Example (cont.)

Step 7: Calculate the Magnitude of each Creditable Change

Emissions Change for Each Creditable Change = PTE – BAE

Netting (cont.)

Example (Step 7: cont.)

	Boilers		Process Heaters	
	NOx	CO	NOx	CO
PTE	0	0	8	40
BAE	20	46	0	0
Change	-20	-46	8	40

Netting (cont.)

Example (cont.)

Step 8: Sum All Changes with Proposed Project

For NOx:

	Emissions Change
Proposed Project	50 TPY
Boilers	-20 TPY
Process Heaters	8 TPY
Net NOx Change	38 TPY < 40 TPY

Netting (cont.)

Example (Step 8: cont.)

For CO:

	Emissions Change
Proposed Project	110 TPY
Boilers	-46 TPY
Process Heaters	40 TPY
Net CO Change	104 TPY > 100 TPY

Netting

QUESTIONS?

Michigan Department of Environmental Quality

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Best Available Control Technology (BACT)

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Outline

- **Introduction (p.85)**
- **Definition (p.85)**
- **Top-Down BACT (p.85-89)**

Introduction

The Best Available Control Technology (BACT) analysis is designed to ensure that state of the art technologies are implemented in order to minimize the impact of any significant emissions increase.

Definition

"Best available control technology" or BACT means an emissions limitation, including a visible emissions standard, based on the maximum degree of reduction for each regulated new source review pollutant from any proposed major stationary source or major modification which the department -- on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs -- determines is achievable for such source or medication through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combination techniques for control of the pollution. . ."

R 336.2801(f)

BACT

BACT means an emissions limitation based on the maximum degree of reduction for each regulated NSR pollutant from any proposed major stationary source or major modification.

Case-by-Case BACT

A BACT analysis is performed on a case-by-case basis for each pollutant subject to the PSD regulations, including visible emissions.

- It is the responsibility of the applicant to perform the analysis.
- It is the responsibility of the AQD to review the analysis, draft the permit, and approve the PSD permit.

Top-Down BACT

The top-down approach considers all available options for reducing emissions. There are five steps in the "top-down" BACT approach.

1. Identify all control technologies;
2. Eliminate technically infeasible options;
3. Rank the remaining control technologies by control effectiveness;
4. Evaluate the most effective controls and document the results;
5. Select BACT.

(USEPA New Source Review Workshop Manual – Prevention of *Significant Deterioration and Nonattainment Area Permitting, DRAFT,* October 1990.)

Minimum BACT

- Must meet the standards in the State Implementation Plan (SIP).
- Meet the requirements of any applicable standard of performance and emissions standard under 40 CFR Part 60 (NSPS) and 61 & 63 (NESHAP) for the source category.

Top-Down BACT – Step 1

Step 1: Identify all control technologies

The first step in a BACT analysis is to identify all available control options for each emission unit or for logical combinations of emission units for each regulated NSR pollutant subject to PSD.

Step 1 – Identification of Control

- Potential control options include add-on controls, such as scrubbers or fabric filters;
- Lower emitting processes and the use of materials that result in lower emissions, such as water-based coating instead of solvent-based coatings;
- Work practices, such as good combustion practices; or
- A combination of control technologies and work practices.

Step 1

Sources of information:

- USEPA's Air Pollution Control Technology Center Verified Technologies (at http://www.epa.gov/nrmrl/std/etv/vt-apc.html) and the RACT/BACT/LAER (RBLC) Clearinghouse (at http://www.epa.gov/ttn/catc/);
- Other government and state agencies websites;
- Testing and monitoring results, permits, and reviews from similar sources;
- Environmental or industry organizations, technical journals and conferences; and
- Control technology vendors.

Air Pollution Control Technology Center Verified Technologies

U.S. ENVIRONMENTAL PROTECTION AGENCY

Environmental Technology Verification Program

Contact Us **Search:** ○ All EPA ◉ This Area [ ] Go

You are here: EPA Home » Research » ETV » Air Pollution Control Center » Verified Technologies

- ETV Home
- Basic Information
- Where You Live
- Verification Centers
- Verified Technologies
- ESTE
- Outcomes
- Collaboration
- ETV International
- Publications

Air Pollution Control Technology Center Verified Technologies

The Air Pollution Control Technology Center has verified technologies in the categories listed below. Each category includes a variety of documents, such as verification reports and statements, test/quality assurance plans and verification protocols.

- Baghouse filtration products
- Dust suppression and soil stabilization products
- Emulsified fuels
- Indoor air quality products
- Mobile sources devices
- Mobile sources fuels
- Mobile sources selective catalytic reduction (SCR)
- Nitrogen oxide (NOx) control technologies for stationary sources
- Outdoor wood-fired hydronic heaters
- Paint overspray arrestors (inactive)
- Volatile organic compounds (VOCs) emission control technologies

Contacts
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Jason Hill, RTI International (919) 541-7443

Technology Transfer Network Clearinghouse for Inventories & Emissions Factors

Emissions Factors and Policy Applications Center
Measurement Policy Group

- Basic Information
- Projects and Workshops
- Emissions Factors / AP 42
- WebFIRE (Factor Information Retrieval System)
- Electronic Stack Testing and Assessment Product (ERT)
- Emissions Factors and Emissions Estimation Tools
- Emissions Monitoring Knowledge Base

Emissions Factors and Policy Applications Center

RBLC Clearinghouse

☑ *MI-0404	GERDAU MACSTEEL, INC. GERDAU MACSTEEL, INC.	81.210	Melt Shop (FG-MELTSHOP)	102-12 01/04/2013
		81.230	Caster (EUCASTER)	
		81.290	Walking Beam Billet Reheat Furance (EUBILLET-REHEAT)	
		81.290	Slidegate Heater (EUSLIDEGATEHEATER)	
		81.290	Roads and packaging (EUROADS&PKG01)	
		81.290	Caster Cooling Tower (EUCASTERCOOLTWR)	
☑ MI-0395	GENERAL MOTORS TECHNICAL CENTER--WARREN WARREN TECHNICAL CENTER	17.110	Nine (9) DRUPS Emergency Generators	160-11A 07/13/2012
		17.110	Four (4) Emergency Generators	
☑ MI-0396	NORTH AMERICAN NATURAL RESOURCES VENICE PARK LANDFILL	17.140	(1) Caterpillar 3516 Generator Engine ("Engine 7")	123-11 05/08/2012
		17.140	(1) Caterpillar 3512 Generator Engine ("Engine 8")	
		17.140	(2) Landfill Gas Generator Engine ("Engines 9&10")	

RBLC Clearinghouse

RBLC ID: MI-0395
Corporate/Company: GENERAL MOTORS TECHNICAL CENTER--WARREN
Facility Name: WARREN TECHNICAL CENTER
Process: Nine (9) DRUPS Emergency Generators

Primary Fuel: Diesel
Throughput: 3010.00 KW
Process Code: 17.110

Pollutant Information - List of Pollutants

Pollutant	Primary Emission Limit	Basis	Verified
Nitrogen Oxides (NOx)	5.9800 G/KW-H	BACT-PSD	NO

Process Notes: Each generator is 3010 KW each (4035 hp each). DRUPS stands for Diesel Rotary Uninterruptable Power supply system. The system provides for zero down-time in electrical energy supply at the onset of a power outage. The system stores energy in a fly-wheel that powers the generator until the diesel engine starts up.

Top-Down BACT – Step 2

Step 2: Eliminate technically infeasible options

Determine the technical feasibility of each control option identified in Step 1.

Technically Feasible

- Control that has been installed and successfully operated at a comparable source is considered to be feasible.
- At least in the licensing and commercial demonstration stage of development.
- Transfer technology

Technically Infeasible

- If it can not be realistically installed and operated on the proposed process, then it probably is not technically feasible.
- Physical, chemical, or engineering data is needed to demonstrate that a technology would not work on the proposed process.
- Not commercially available

Top-Down BACT – Step 3

Step 3: Rank the remaining control technologies by control effectiveness

The control options are ranked from the most effective to the least effective in terms of emission reduction potential.

Step 3 - Ranking Control

- The same units of measure should be used to compare performance levels of all options on the list.
  - % of control effectiveness
  - Controlled emission rate

- This should be done for each emissions unit and each logical grouping of emissions units for each PSD pollutant.

Top-Down BACT – Step 4

Step 4: Evaluate the most effective controls and document the results

This involves an analysis of all energy, environmental and economic impacts associated with the list of available control technologies.

Energy Impacts

Determine any energy penalties or benefits that result from using each control technology.

Environment Impacts

Examples of environmental impacts include:

- Solid or hazardous waste generation,
- Discharges of polluted water, visibility impacts, or emissions of non-NSR pollutants.

If reduction of the pollutant under review is small compared to the collateral increase in another pollutant, the control option may potentially be eliminated.

Economic Impacts

- Cost effectiveness (annualized cost), is measured in dollars per ton of pollutant removed and includes both the cost to install and operate.
- The cost analysis methods in the Office of Air Quality Planning and Standards (OAQPS) Control Cost Manual (USEPA 453/B-96-001) may be used to assure consistency with other BACT analyses.

Cost Effectiveness

- The cost effectiveness is calculated in two ways: average cost and incremental cost.

$$\text{Average Cost} = \frac{\text{Annualized Control Cost}}{\text{Uncontrolled Emissions-Controlled Emissions}}$$

Cost Effectiveness (cont.)

The incremental cost is the difference in cost between two control options.

- Used to analyze the difference between the control options with the most emission reductions for the least cost.

$$\text{Incremental Cost} = \frac{\text{Annualized Control Cost of Option 1} - \text{Annualized Control Cost of Option 2}}{\text{Emissions Reduced by Option 1} - \text{Emissions reduced by Option 1 2}}$$

Cost Effectiveness - Example

Control Technology 1 –

To control 102 tons per year the
Average Cost = $5,200/ton

Control Technology 2 –

To control 100 tons per year the
Average Cost = $5,000/ton

Cost Effectiveness - Example

Control Technology 1 Annualized Cost = $530,400
(i.e., $5,200/ton x 102 tons)

Control Technology 2 Annualized Cost = $500,000
(i.e., $5,000/ton x 100 tons)

Incremental Cost = $15,200 per ton
(i.e., $530,400 - $500,000 / 102 tons – 100 tons)

Control Technology 1 controls two more tons than Control Technology 2, but **incrementally**, costs $15,200 per ton for the two tons. It may not be cost effective to select Control Technology 1.

Cost Effectiveness (cont.)

In order to eliminate a control option on the basis of economic infeasibility;

- The applicant must demonstrate that the control technology is significantly more than the control costs being borne by other similar sources, and
- Not cost effective in its own right as in the cost of the control equipment is high compared to the total project cost.

Top-Down BACT – Step 4

It must be demonstrated that the control technology is significantly more than the control costs being borne by other similar sources.

Top-Down BACT – Step 5

Step 5: Select BACT

The most effective control option not eliminated under Steps 1 through 4 is proposed as BACT.

Top-Down BACT – Step 5 (cont.)

Establishing BACT Limits

- The BACT emission limit must be met at all times;
- Contain appropriate averaging time periods; and
- Have proper compliance procedures and recordkeeping for the averaging period.

BACT Emissions Limitations

- The emissions limit must be practically enforceable.
- The averaging time and monitoring method must be consistent.
- Any assumptions used need to be incorporated into enforceable limits.
- Design, equipment, or work practice standards may be used in lieu of a numerical emission limit.

Example of Limitations

PTI 160-11A: General Motors Technical Center - Warren

I. EMISSION LIMITS

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Testing / Monitoring Method	Underlying Applicable Requirements
1. NOx	5.98 g/kW-hr	Test Protocol*	Each engine: EUDRUPS1, EUDRUPS2, EUDRUPS3, EUDRUPS4, EUDRUPS5, EUDRUPS6, EUDRUPS7, EUDRUPS8, EUDRUPS9	GC13	R 336.2803, R 336.2804, R 336.2810 40 CFR 52.21(c), (d) & (j)

Top-Down BACT – Step 5 (cont.)

The BACT emissions limitation can not cause a violation of NAAQS or PSD Increment.

BACT ANALYSIS EXAMPLE
COMBINED-CYCLE NATURAL GAS-FIRED TURBINES

Parameter	Design Value
Number Of Emissions Units	4
Emissions unit Identification	New natural gas fired combustion turbine with dry low-NO_X burners; each turbine is equipped with a heat recovery steam generator and natural gas-fired duct burners
Gas Turbine Output	163 Megawatts
Steam Turbine Output	424 Megawatts
Turbine Heat Input	1,685 million Btu/hr
Duct Burner Heat Input	245 million Btu/hr
Exhaust Temperature	209 °F
Turbine Hours Of Operation	8,760 hr/yr
Duct Burner Hours Of Operation	4,000 hr/yr
Uncontrolled Emissions (per turbine/duct burner)	NO_X 200.7 tpy CO 262.5 tpy SO_2 9.3 tpy VOC 108.1 tpy PM 61.8 tpy GHGs 989,069 tpy

Step 1 – Identify All Control Technologies

Available control technologies:

- SCONOX™
- Selective catalytic reduction system (SCR)
- SCR with water or steam injection
- Selective non-catalytic reduction system (SNCR)
- Water/steam injection

Step 2 - Eliminate Technically Infeasible Options

SNCR can be eliminated as technically infeasible because an exhaust gas temperature of 1,300 to 2,100°F is required, which is much higher than the exhaust gas temperature of a turbine.

Step 3 – Rank Remaining Control Technologies

Control Option	Performance Level (% Efficiency)	Emission Reduction (tpy)	Expected Emission Rate (ppm)
SCONOX™	98	196.7	1-2
SCR	95	190.7	1-3
SCR w/water or steam injection	90	180.6	6-9
Water/steam injection	80	160.6	25-42

Step 4 – Evaluate the Most Effective Controls

1st choice—SCONOX™

- Energy and environmental impacts include the increased use of natural gas, reduced power output for the turbine, an increase in water use, and additional wastewater generation.

2nd choice—SCR

- Energy and environmental impacts are not considered adverse or a cause for elimination. There may be an increase in particulate emissions while using an SCR system due to the potential formation of ammonia sulfates.

Step 4 (cont.) – Economic Impact

	SCONOX™	SCR
Direct capital cost	$15,000,000	$4,000,000
Indirect capital cost	$2,400,000	$800,000
Total capital investment	$17,400,000	$4,800,000
Direct annual cost	$3,680,000	$1,000,000
Indirect annual cost	$1,500,000	$500,000
Total annual cost	$5,180,000	$1,500,000
Tons NO_X reduced	196.7	190.7
$/ton reduced	$26,335	**$7,865/ton**

The analysis can stop here since it is shown that SCR is the best choice for BACT.

Step 5 – Select BACT

BACT for the turbines is demonstrated to be SCR systems with a NOx emission limit in the range of 1 – 3 ppm.

But the applicant is not finished!

- Appropriate averaging time periods; and
- Proper monitoring and recordkeeping need to be proposed.

BACT Pit-Falls

- Confusing technically infeasible with cost effective.
- Applicant does not propose a BACT emission limit. (e.g., BACT is not a control device.)
- Not proposing a monitoring method that shows compliance with the BACT emission limit.
- Not proposing an averaging time that is enforceable as a practical matter.

Summary

- A case-by-case BACT analysis is a complex permitting process.
- It may be helpful to meet with the MDEQ prior to submitting a BACT analysis to assure completeness.

Questions?

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DISPERSION MODELING

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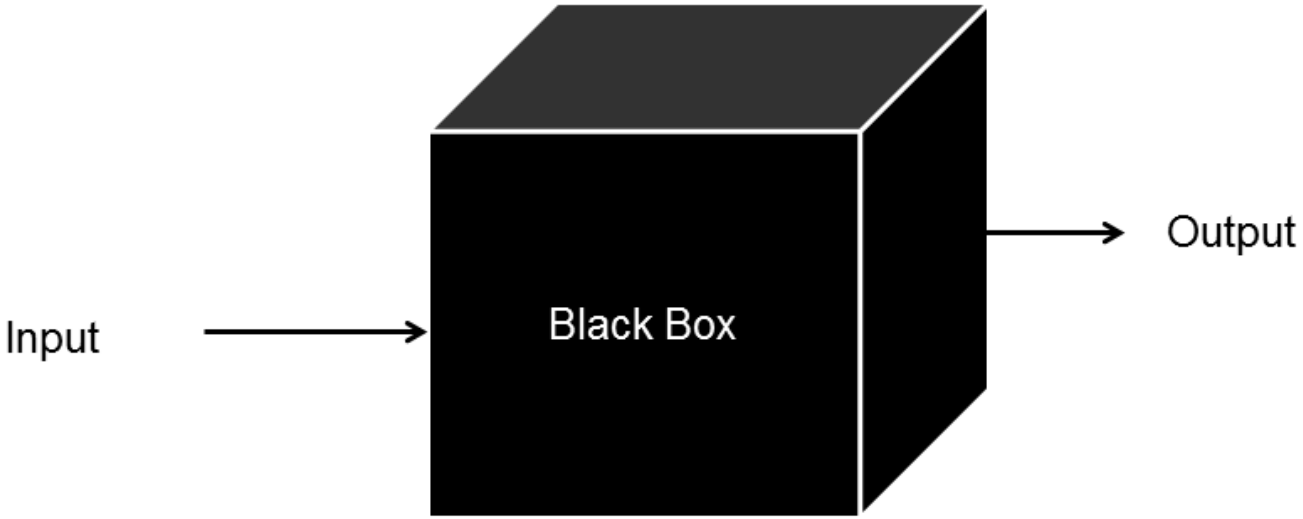
Air Quality Models



Internal behavior of the code is unknown

Prediction of Ambient Impacts

- Provide estimates of the relationship between emissions and the resulting ambient impact.

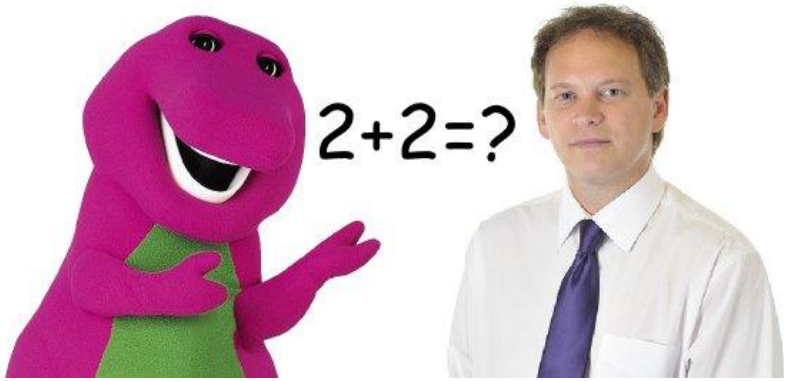
Prediction of Ambient Impacts

- Simulate conditions using emission and flow rates, angle of release, exhaust temperature, wind speed, wind direction, ambient temperature, atmospheric stability, chemical transformation rates and physical removal rates;

- Resultant maximum ground level concentration is then compared to the NAAQS or PSD Increments.

Level of Model Sophistication

- **Screening Model**
  - AERSCREEN



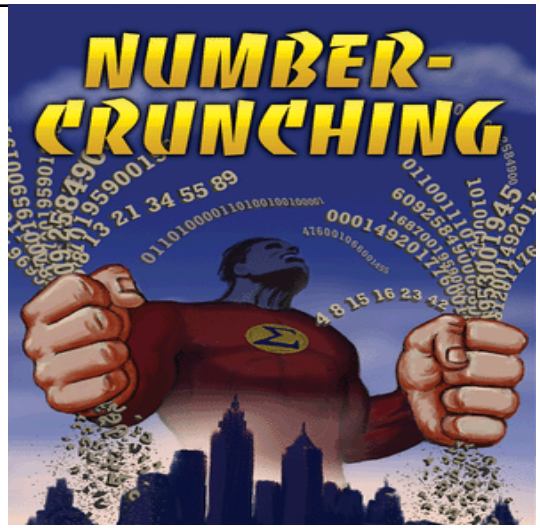
- **Refined Models**
  - AERMOD
  - CALPUFF

AERSCREEN

- A simple, interactive program which can quickly perform single source, short-term calculations;

- Retains many of the simplicities of its predecessor, SCREEN3, while including many of the more sophisticated features found in the USEPA's preferred refined model, AERMOD.

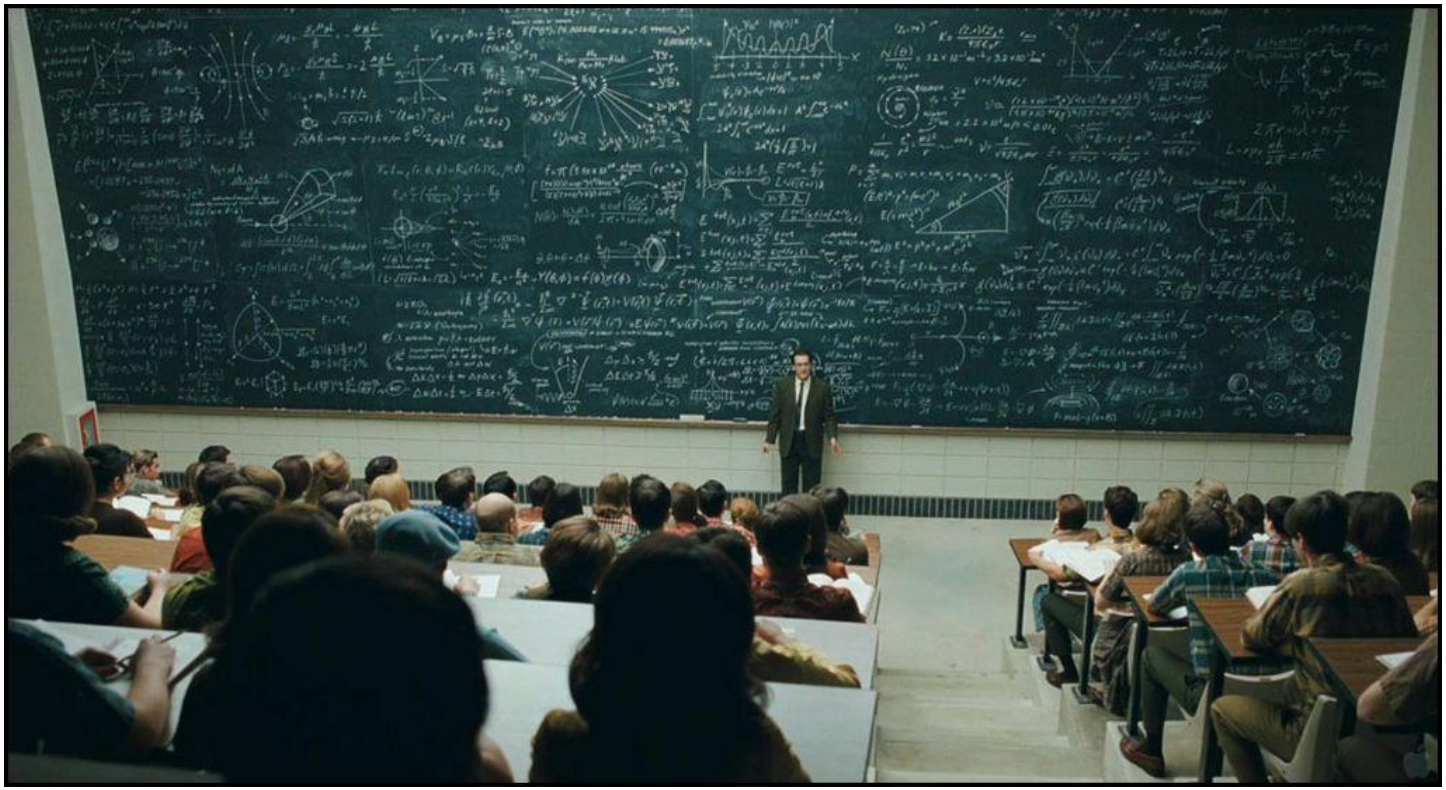
AERMOD



- Steady state plume dispersion model for assessment of pollutant concentrations from a variety of sources;
- Simulates transport and dispersion from multiple points, area, and volume sources;
- Employs hourly sequential meteorological data to estimate concentrations for averaging times ranging from one hour to one year.

AERMOD PRE-PROCESSORS

- **AERMET /AERSURFACE / AERMAP**



AERMET

- Meteorological pre-processor for the AERMOD program;
- Organizes available meteorological data into a format suitable for use by the AERMOD model;
- Can incorporate 1-minute meteorology (AERMINUTE) for better resolution and fewer calms.

AERSURFACE

- Processes land cover data to determine the surface characteristics for use in AERMET.

AERMAP

- Simplifies and standardize the input of terrain elevation data for the AERMOD program.

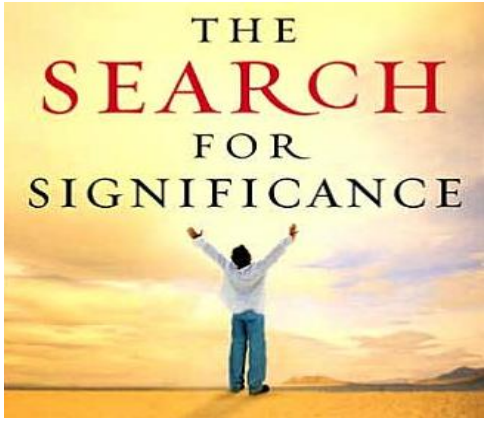
CALPUFF

- Visibility assessments and Class I area impact studies.

Modeling Elements

- **Significant Impact Analysis**
- **PSD Increment**
- **NAAQS**

Significant Impact Analysis



- Determines the predicted net impacts from the proposed project;
- If the predicted net project impact is less than the Significant Impact Level (SIL), the emissions of that pollutant will not be considered to cause or contribute to any violation (PM2.5 current exception);
- Net project impacts greater than the SIL require further analysis.

PSD Increment Analysis

- Maximum allowable increase in concentration that may occur above a baseline concentration;
- All sources (major and minor) installed after the applicable baseline date consume increment;
- Highest-2nd-High concentrations (non-annual) predicted over 5 years should be used.

NAAQS Analysis

- NAAQS is based upon the total modeled air quality impact rather than just the post-baseline net increase;

- All nearby sources that have modeled impacts with a significant concentration gradient overlapping the proposed project;

- The ambient background, based on monitored air quality data, must be added to the modeled impact;

Nearby Source Emissions Inventory

- An emissions inventory of nearby sources can be requested from the MDEQ;
- Facilities, which do not have overlapping significant concentrations gradients, are no longer explicitly modeled and are assumed to be part of the background.

Background Concentration Pre-Construction Monitoring

- At least one year of continuous air monitoring data to determine background is required;
- If there are no monitors located in the vicinity of the source, a "regional site" may be used to determine background;
- A "regional site" is one that is located away from the area of interest but is impacted by similar natural and distant man-made sources.

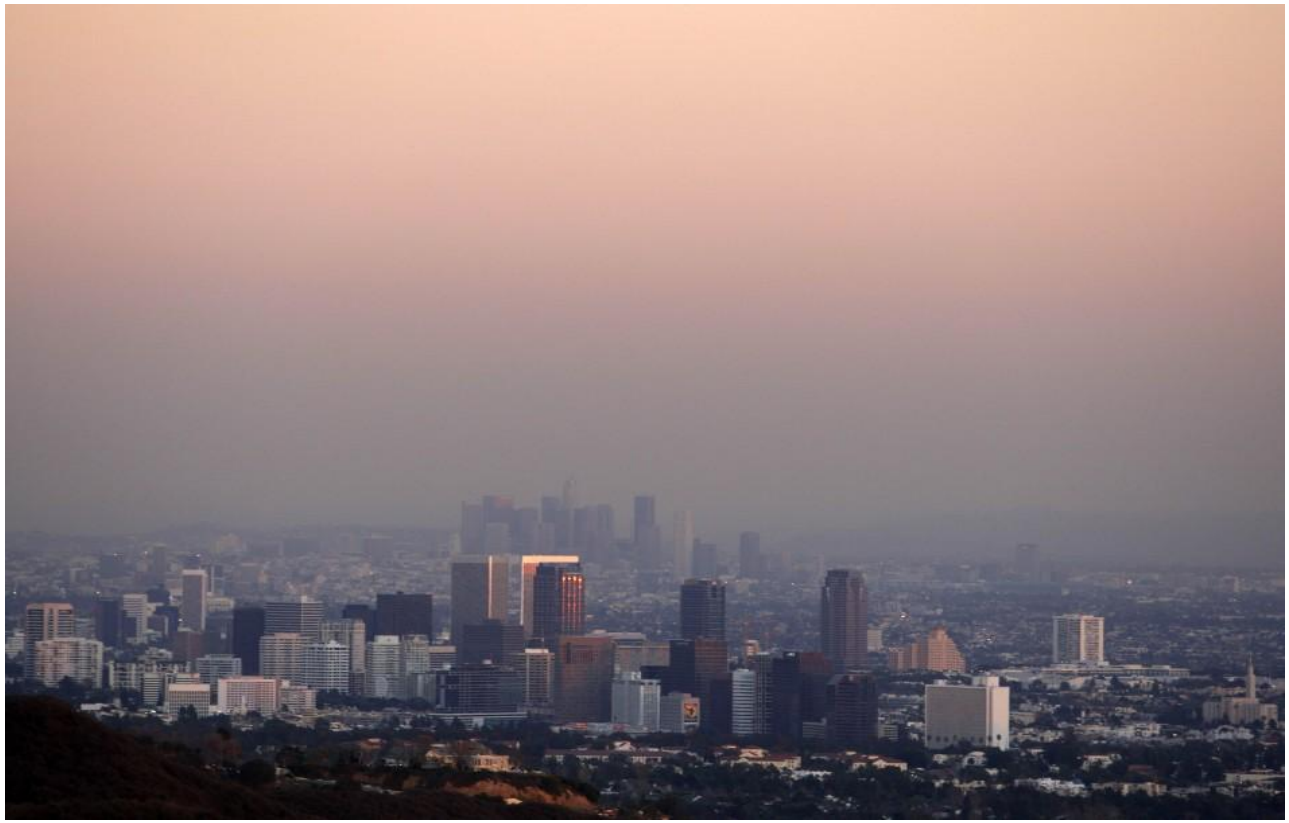
Pre-Construction Monitoring Waiver Request

- All major new or modified sources that are required to conduct a full impact analysis should request a pre-construction monitoring waiver from the AQD, even if impacts are below Significant Monitoring Concentrations (SMC);

- In most cases, adequate representative existing monitoring data exists such that a monitoring waiver can be granted by the MDEQ.

Secondary Pollutant Analysis

- Ozone
- Non-primary PM2.5



Secondary Pollutant Analysis

- USEPA now requires a formal evaluation of secondary pollutants during Increment and NAAQS air impact reviews;

- No USEPA promulgated tools are currently available;

- USEPA has issued draft guidance for addressing secondary impacts of PM2.5 resulting from significant SO2 and/or NO2 emissions.

Revoked NAAQS Thresholds

- Recently revoked NAAQS pollutants:
  - SO2 (24-hour)
  - SO2 (annual)
  - PM10 (annual)

- Note that PSD Increment ***still*** applies to revoked NAAQS pollutants.

Modeling Protocol Submittal

- Full PSD modeling analysis must be submitted by the applicant. MDEQ will review and validate;

- Applicants for PSD permits are advised to submit the details of their proposed modeling analysis to the MDEQ before a PSD application is submitted;

- The USEPA mandates their review and approval of any submitted modeling protocol if the suggested methodology involves any deviation from AERMOD default settings.

Common Modeling Slip Ups

- Incorrect meteorology data;
- No nearby source inventory;
- No secondary analysis;
- No preconstruction monitoring waiver;
- Under-qualified technical staff;
- Poor documentation; Poor QA/QC.

ADDITIONAL IMPACT ANALYSIS

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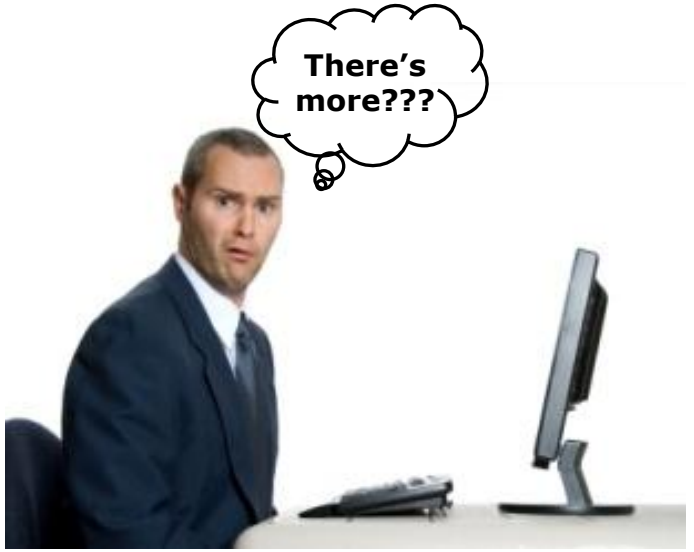
Additional Impact Analysis (AIA)

- All PSD permit applications must include an additional impacts analysis for each pollutant subject to PSD;



- AIA includes, but is not limited to, three parts:
  - Growth
  - Soil and Vegetation Impacts
  - Visibility Impairment

Growth Analysis

- The elements of a growth analysis include:
  - A projection of the associated industrial, commercial, and residential growth that will occur in the area due to the proposed project;
  - An estimate of the air emissions generated by the growth.

Soils and Vegetation

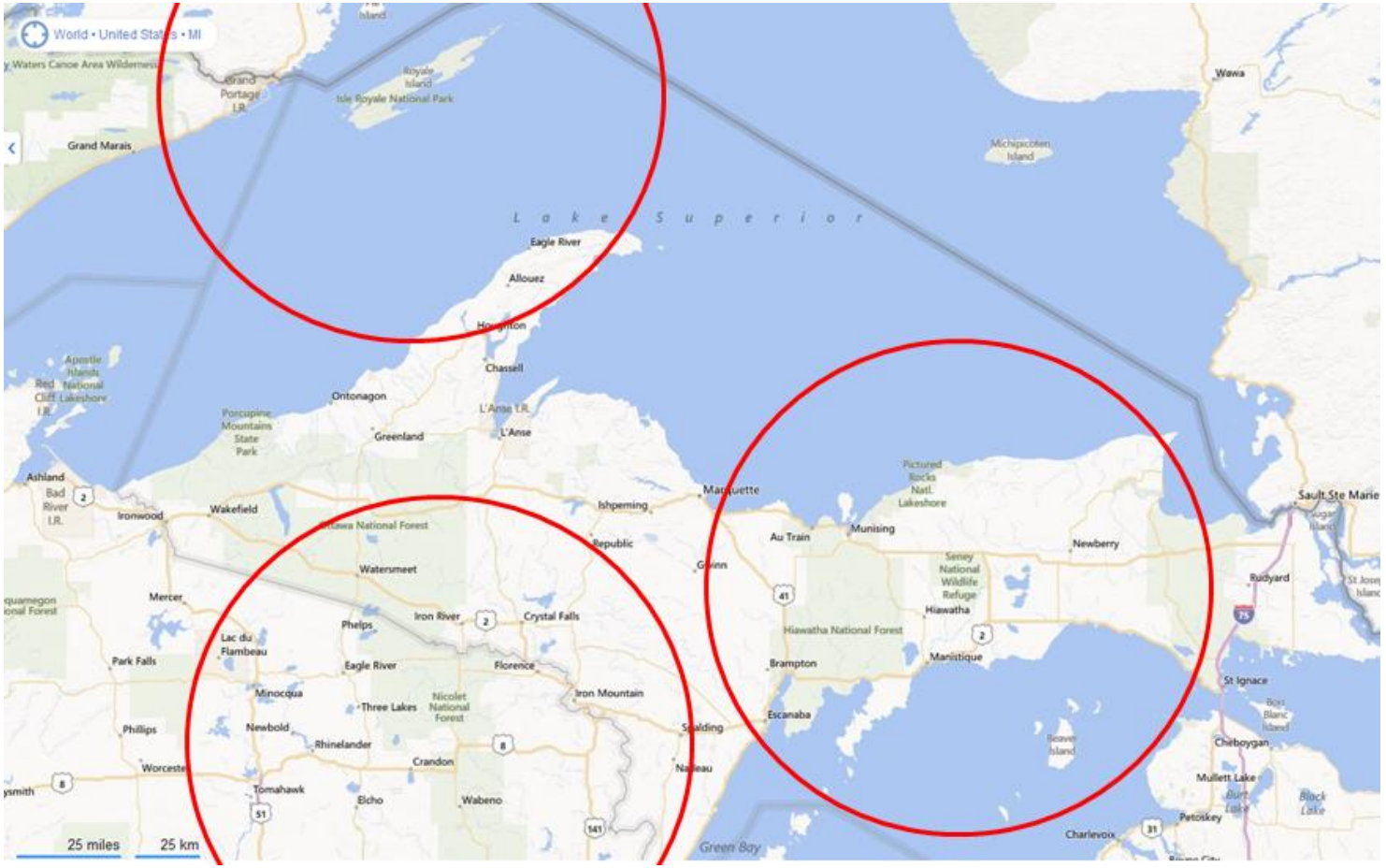
- Analysis of impacts on soils and vegetation should be based on an inventory of the soil and vegetation types found in the area;
- Should include all vegetation with any commercial or recreational value.

Class I Areas Impact Analysis

- Class I areas are areas of national or regional natural, scenic, recreational, or historic value for which the PSD regulations provide special protection as well as additional protection of visibility;

- Class I areas allow a lower increase in concentrations of pollutants (increment) above baseline concentrations than Class II areas.

Class I Areas Impact Analysis Mandatory 100 km Radius



Local Visibility Considerations

- Icing and Fogging

Local Visibility Considerations

- Fugitive Dust

Local Odor Considerations

- Odor Modeling

QUESTIONS?

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Decision-Making and Public Participation

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Outline

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Introduction

All PSD permit applications are subject to the requirements for public participation in Michigan's State Implementation Plan (SIP).

Public Participation

Other permits that could be subject to the public participation process:

- Net outs of PSD
- Opt out permits (contain restrictions greater than 90% of applicable thresholds)
- Controversial permit actions

Permits Under Review

Not all permit applications go through public participation.

- A list of all applications under review is available at: http://www.deq.state.mi.us/aps/PendApps.asp.
- This list is sent monthly to each board of County Commissioners.

Draft Conditions

Once an application is both administratively and technically complete, and the technical review is concluded, a draft permit is developed.

Notice of Hearing and Fact Sheet

A notice of hearing and fact sheet is prepared for each draft PSD permit.

- The fact sheet provides a description of the proposed process, the issues considered in preparing the draft permit, and other items of interest.

Notification

Components of the public participation process include notifying all interested parties of a public comment period, and the opportunity for a hearing.

- Legal notice in a local paper of general circulation.
- Electronic communication - Copies of public participation documents are placed on the MDEQ web page (http://www.deq.state.mi.us/aps/cwerp.shtml).
- A notice of the pending permit action is also placed in the MDEQ calendar.
- Area mailing lists either via direct or electronic mail.

Content of a Public Notice

The notice covers the details of the proposed action, and includes the following:

- Name and address of the facility;
- A brief description of the permit application;
- Contact information of a person from whom interested persons may obtain further information on the application;
- A brief description of the comment procedures, the time and place of any hearing, including how to request a hearing; and
- A brief description of the nature and purpose of the hearing.

PUBLIC NOTICE

Because the People Want to Know

ORION TWP.

NOTICE OF AIR POLLUTION COMMENT PERIOD AND PUBLIC HEARING

The Michigan Department of Environmental Quality (MDEQ) is holding a public comment period from October 2, 2013, until November 1, 2013, and a public hearing, if requested, on November 6, 2013, on General Motors, LLC – Orion Assembly Plant's proposed installation and operation of five landfill gas fired engines and associated generator sets to produce electricity for the facility. The facility is located at 4555 Giddings Road, Lake Orion, Michigan. The public comment period and hearing, if requested, are to allow all interested parties the opportunity to comment on the Department's proposed conditional approval of a Permit to Install (PTI). It has been preliminarily determined that the project will not violate any of the Department's rules nor the National Ambient Air Quality Standards.

This proposal is subject to the state and federal Prevention of Significant Deterioration rules and regulations for a modification to an existing major stationary source based on the emissions of carbon monoxide (CO). All other emissions of regulated new source review pollutants from the engines were either less than a significant increase or less than a net significant increase for the project.

Additionally, the new air pollution control systems will require revisions to Renewable Operating Permit (ROP) No. MI-ROP-B7227-2009b (SRN B7227). This public comment period meets the public participation requirements for a future administrative amendment to the ROP.

Copies of the staff's analysis and proposed permit conditions are available for inspection at the following locations, or you may request a copy be mailed to you by calling 517-335-4607 until October 4, 2013 or 517-284-6793 after October 4, 2013. Please reference PTI Application Number 81-13.

DEQ

DEQ Web Page

The Department of Environmental Quality is seeking comment on the following applications:

Holland Board of Public Works - Permit to Install Application No. 107-13

Comment Period October 28, 2013 until November 27, 2013.

- Draft Permit Terms and Conditions - View
- Notice of Hearing - View
- Fact Sheet - View
- Company Letter - View
- Interested Party Letter - View
- Submit Comment *(please read note above and view example)*

Kirtland Products - Permit to Install Application No. 47-11B

Comment Period October 9, 2013 until November 8, 2013.

- Draft Permit Terms and Conditions - View
- Notice of Hearing - View
- Fact Sheet - View
- Company Letter - View
- Submit Comment *(please read note above and view example)*

General Motors LLC - Orion Assembly Plant- Permit to Install Application No. 86-13

Comment Period October 2, 2013 until November 1, 2013.

- Draft Permit Terms and Conditions - View
- Notice of Hearing - View
- Fact Sheet - View
- Company Letter - View
- Submit Comment *(please read note above and view example)*

Public Input Process

Following are the components of the public input portion of the decision making process:

- Public Comment Period
- Informational Meetings
- Public Hearing
- Public Comments

A public comment period lasts a minimum of 30 days.

Informational Meetings and Hearings

- An informational meeting may be held to provide interested parties with the opportunity to ask questions of the MDEQ staff.

- Public hearings provide the public with the opportunity to submit verbal testimony directly to the decision-maker.

Public Comments

All written comments submitted during the public comment period, as well as oral comments provided at the public hearing, are considered.

- Comments may generate additional questions to be answered or additional technical review.
- Air quality comments are addressed in a response to comment (RTC) document.

Permit Decision

A final permit decision is made by the decision-maker. The decision-maker will take one of the following actions:

- Approve as drafted
- Approve with amendments
- Deny the permit

All interested parties are notified of the decision.

Appeals

A decision on a PSD permit may be appealed in one of two ways, depending on whether the source is new or existing:

- For a new source, any person has the ability to appeal under section 324.5505(8) of Part 55 of NREPA, Act 451 of 1994 (as amended).
- For an existing source, any person has the ability to appeal under section 324.5506(14) of Part 55 of NREPA, Act 451 of 1994 (as amended).

Permit Issued – Commence Construction!

Questions?

www.michigan.gov/deq

(800) 662-9278